Inter-disciplinary study of Team-work during Design for Social Innovation projects.

Volume 1: Main text

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Abstract

The rising demand of teamwork during Design for Social Innovation (DfSI) projects has created a need for professional development to be able to work cordially within teams. Traditionally, reflective practices have been considered most effective for the development of professional practice in the field of Design. However, enactive cognitive science points to the practice of Awareness-based Meditative Techniques (AbMT) as an alternate way for such development. Such AbMTs have been extensively studied by different disciplines. This research borrows from:

- Social science and positive psychology perspectives, where the act of becoming aware has been associated with an inner value system that guides behaviour. Theoretical perspective from many authors from various backgrounds in AbMT research have been reviewed to propose a model of inner values which could affect teamwork during DfSI project as well as be influenced positively by the practice of AbMT intervention.
- A physiological perspective, to measure Heart Rate Variability (HRV) as an indicator of the physical stress which is known to e reduced by AbMT due to an improve ability to deal with such stress.
- A psychological perspective, using the Mindful attention and awareness scale (MAAS) questionnaire for quantitative research on the practice of AbMT intervention by participants.

Taking a post-positivist stance, this research focuses on creating a depth of information utilising these inter-disciplinary methods. Therefore, three teams working on three similar social innovation projects have been studied for eight weeks- one team populated with all meditators, another with all non-meditators and a third team with both. Analysis of reflections by team members on their own teamwork led to conclusion that- *AbMT intervention could lead to improved teamwork during a DfSI project, especially with regard to the responsibilities perceived as the leadership of the team*. This is because the meditators in this research reflected that, because of AbMT intervention they could

- share responsibilities which they perceived as pertaining to leadership of their team not only with other members of their team but also with the wider community of stakeholders,
- prioritise reflective action over unproductive debates for the better functioning of the team rather than satisfaction of own ego and
- change their perception from ‘goal oriented’ to ‘people oriented’ approach.

Further it was observed that, teams with meditators could use ‘framing’ and ‘reflecting’ activities to work in multi-disciplinary setting of their team and utilise strength of knowledge of their team. It was also observed that teams with meditators got overly focused on social innovation aspects while working with the community of stakeholders and users, and the team temporarily lost focus of financial viability until the client (sponsor) helped the team to regain their focus. However, the relationship between such findings and the effect of AbMT intervention could not be conclusively asserted, though the intervention is one of the key influences on the teams during their DfSI projects.

Thus, the key contributions to knowledge from this research are: the model of inner values, the development of the inter-disciplinary hybrid research methodology and evidence of the positive influences that AbMT intervention can have on the teamwork during DfSI projects.

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Author's Declaration

This research and thesis is the original work of the author and has not been submitted and accepted for any other degree. The use of work from other sources has been acknowledged and referenced in the reference list provided with the thesis. Relevant ethical approvals have been acquired and approved procedures have been utilised during the research. The word count of the thesis is 81834 words.

Signed:

Pratik Vyas

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Chapter 1: Introduction

This chapter introduces the reader to the focus of this research, the intention for conducting this research, the intended audience this research addresses, the aim and the objectives of this research and the structure of this thesis.

1.1 Purpose of chapter

This chapter introduces the focus of this research, the intention for conducting this research, the intended audience, the aim and objectives set out for this research and the structure of this thesis.

1.2 Research Focus

Design for Social Innovation (DfSI) has gained importance in a variety of fields such as; educational institutions (e.g. ISTEAD, Stanford etc.), government organizations (e.g. the US Social Innovation Fund, Social Innovation within the European Horizon 2020 Flagship Initiative, "The Innovation Union"), third sector non-profits (e.g. the Young Foundation, the Centre for Social Innovation Toronto, and the Centre for Social Innovation Vienna etc.) and more recently a growing section of the private sector. Such initiatives are not only interested in social innovation within their organization but also with the community that they exist in and work with. This has made Design the touchstone to address wicked problems in a variety of fields in the past forty years (Lawson, 2006). In such scenarios designers not only need to be capable of working in a multi-disciplinary structure but they also need to be able to go beyond their own creative practice and draw out problem understanding and creative solutions *WITH* a community. Therefore, there is rising responsibility on designers that goes beyond the idea of the development of professional practice and touches on the need for change in the inner value system (Argyris and Schön, 1974) of designers and design teams, so that they can create legacy by building relationships and facilitate community engagement during DfSI projects.

Reflective practices have been extensively applied in Design for improving professional practice of individual practitioners and teams through 'the act of becoming aware' (Schön, 1983). This research proposes an alternate understanding drawn from enactive cognitive science where 'the act of becoming aware' arising through the practice of Awareness-based Meditative Technique (abbreviated as AbMT for convenience) can be proven to be useful because such practice unites the action and reflection activities. Though theoretically such an approach sounds convenient, this research addresses the practical aspects of introducing meditation to participants through different means. For instance; considering the complexity of introducing assisted practice which avoids observation bias (Hawthorne effect),

understanding the effect of such practice from different disciplinary perspectives and attempting to understand the inner value system of teams, which can be said to have guided their behaviour and actions during the teamwork for DfSI project. This research investigates the effects of AbMT on the behaviour of team members as well as on the mental and physical stress that they experience during teamwork. The premise of this research is that the practice of AbMT (Varela, 1993) can inspire professional growth for teamwork during DfSI, which not only aids in dealing with teamwork, but enhances the capability of teams to implement design strategies that encourage community participation and collective innovation.

To study the effect of AbMT intervention brings forth the need to verify effective meditative practice by the participants. The practice of AbMT has been extensively studied in the field of psychology and medicine. These studies have proven that AbMT creates a positive change in the physiological stress through regular practice. Different quantitative measures are available for confirming the effective practice of AbMT interventions using various physiological stress markers (Thayer et. al., 2012) such as Heart rate, Magnetic resonance imaging (MRI)[1], Positron emission tomography (PET) scans[2], blood test, saliva test etc. For this research, Heart Rate Variability (HRV) has been selected to verify the effective practice of AbMT intervention by the participants because it is a well-established concept, it has non-invasive research methods and it requires low investment. Further, the psychological development also needs to be verified. A psychology based questionnaire called, Mindful Attention and Awareness Scale (MAAS), has been selected to aid this understanding quantitatively. But, the quantitative methods have the drawback that they are not descriptive. For this reason, a thematic qualitative method has been used on data collected about DfSI projects through reflective interviews with the design team members. The explanation from Valkenburg and Dorst (1998) has been used to identify the design activities explained in the qualitative data. Further, certain inner values within the context of teamwork during DfSI and which can be affected by AbMT practice have been recognised from a review of key literature and verified using a survey with expert DfSI practitioners. These inner values have been used to propose a model that can support case studies with a further description of the inner value system that the team may have had during a DfSI project. Finally, the findings

[1]MRI is a medical imaging technique used in radiology to image the anatomy and the physiological processes of the body in both health and disease.
[2]Positron emission tomography(PET)is a nuclear medicine, functional imaging technique that is used to observe metabolic processes in the body.

from the quantitative and qualitative research methods have been discussed to create an in-depth understanding of the different effects of AbMT intervention on the mind, the body and the behaviour of the participants working in teams during DfSI projects.

1.3 Research Intent

The motivation for this research stems from the researcher's background as a web developer and an interaction designer in the field of HCI. The researcher was interested in using participatory methods for the development of new techniques in the field of open data for social innovation. The researcher encountered difficulties while keeping together the different multi-disciplinary stakeholders and users for collective innovation. The researcher used technology to aid the process but in vain. After self-reflection, the researcher realised the key was to build a certain awareness during stakeholder engagement sessions (in person and online), which would bring everyone onto an equal platform to aid the exchange of ideas. As an Indian, the researcher was introduced to meditative practices as a child to build awareness. The researcher learnt, practiced and investigated different meditative techniques and found them useful to build awareness that assisted teamwork during such DfSI projects. The experience inspired the researcher to understand the wider applicability of such methods for personal and professional development, which goes beyond contemporary scientific understanding and addresses problems such as the development of professional practice through the regular practice of meditation. The eclectic nature of the field of Design makes it possible to assemble knowledge from different disciplines into a new design-based sense making process (Gaver, 2012). For this reason, the researcher chose to pursue a PhD in the context of Design, to learn and to understand the effect of meditation on designers and the design process. The researcher built a theoretical perspective from the review of literature using inductive reasoning and conducted research and observations to confirm the theory using deductive reasoning.

1.4 Audience of research

In the past, the concept of awareness has been looked at from the point of view of reflective practice in design literature. Developing understanding about our own experience through reflective practice is important for development as a professional, and awareness is important to develop such reflection. This research uses awareness for a wider consideration beyond

personal professional development where the inner value system is affected, underlying assumptions change and the belief system evolves into a more inclusive practice. Such a practice can be useful for professionals, any professional, who works in a team construct (Moon, 2013). However, this research is focused on studying teamwork during a DfSI project and to investigate if AbMT can bring about such intended change. Thus, the primary audience of this research would be design students, academics and practitioners interested in development of professional practice while working in teams during DfSI project.

During this research, a review of key literature led to a list of inner values recurring in works of different authors who considered them to be important for teamwork during DfSI projects. Though this list is not exhaustive, it is the start of an enquiry and a beginning to gathering reflections on Design practice and use them for development of design education (Woods, 2011). Using a descriptive questionnaire, this research generates insights from expert DfSI design practitioners on the inner values and complexities surrounding them. Thus, this research may also speak to researchers and academics who wish to understand design practice in terms of the development of an inner value system.

Last but not least, this research utilises a variety of research methods such as; case study method with qualitative data analysis, an experimental approach for HRV data, a questionnaire method for both qualitative and quantitative data analysis. The different methods woven together into a mixed-method research strategy have been applied to understand the different physiological, psychological and social effects of AbMT on teamwork during DfSI. Such a mixed-method research strategy described in the thesis may be useful for researchers who would wish to conduct similar inter-disciplinary research in the future.

1.5 Aim and Objectives

Aim: To investigate the effects of Awareness-based Meditative Technique (AbMT) on the teamwork applied during Design for Social Innovation (DfSI) projects.

Objectives: To achieve the aim, the following objectives have been recognised:

Objective 1. To construct a working understanding of key relevant concepts, which include; design, teamwork, social innovation, inner values and AbMT research.

The objective is to understand the critical issues in teamwork during DfSI projects as recognised by different authors and the need for intervention for the development of professional practice. Firstly, the literature will be reviewed to demonstrate how the key concepts relate to each other. Then, it is important to explore prior research in AbMT intervention and review the methods used by such studies. As AbMT could bring change in the underling inner value system, it is important to recognise some of the key inner values that existing literature considers as being associated with teamwork, DfSI and are affected by the practice of AbMT.

Objective 2. To devise a methodology to appropriately apply the thematic qualitative analysis method along with the proposed model of inner values and integrate necessary quantitative methods that verify the effects of AbMT intervention.

The objective is to identify the different types of data collection techniques that will help gather qualitative and quantitative evidence of the effect of AbMT intervention on teamwork during DfSI projects. For this reason, it is important to understand the different research methodologies that can be applied to AbMT research and to address issues pertaining to validity while mixing these methodologies. It is also important to select a practice of AbMT intervention that could be considered appropriate for this research. Finally, it is critical to robustly define the data collection and analysis process for both, the qualitative and quantitative research methods, to clearly define the mixed method approach that will be applied during this research.

Objective 3. To conduct primary and supporting studies to gather data:

Conduct supporting studies which fortify the research, such as;

- verifying the face validity of the proposed model of inner values with a review from expert design practitioners,
- the confirmation of inter-rater reliability that addresses internal and construct validity of the process of qualitative analysis and
- authenticating credibility of the device, process and procedures for quantitative research.

Then, identify appropriate participants and social innovation projects for data collection and introduce selected teams to the concept of AbMT intervention. Collect, transcribe, sort and store the data while maintaining all ethical considerations.

Objective 4. To analyse and interpret data and draw conclusions, this objective is divided into two sub-objectives;

a) Through analysis of the quantitative data, corroborate successful practice of AbMT intervention by the participants.

The objective is to verify the effective practice of AbMT intervention by participants and confirm the meditating and non-meditating teams. For this, it is important to build hypotheses for drawing a correlation between different variables of the quantitative data (HRV and MASS) and apply the pre-defined methods of quantitative analysis to prove or disapprove each of the hypotheses. Further, it is important to present and discuss the findings to draw out conclusions from the quantitative analysis.

b) Through analysis of the qualitative data, understand the experience of different participants regarding their teamwork and contextualize the experiences within an understanding of design activities and of the inner value-system by the different teams during team-based DfSI projects.

The objective is to compare the team work by different teams as described by the respective team members. For this, the reflective record of the experiences of different team members will be compared using thematic qualitative analysis and contextualised using Valkenburg and Dorst's (1998) explanation of the design process. Further, the inner value system during teamwork for the DfSI project will be visualised by combining the reflections of different members of that team and applying the model of inner values that was proposed from the review of literature. Finally, the findings will be discussed to relate the findings from thematic analysis of the teamwork applied during the different DfSI projects with the findings from quantitative analysis and draw defendable conclusions.

1.6 Structure of thesis

Chapter One: Introduction

This chapter introduces the focus of this research, the intention for conducting the research, the aim and objectives of this research and the structure of this thesis.

Chapter Two: Literature review

This chapter introduces and defines the key concepts in existing literature, which is; Design, teamwork, social innovation and awareness based meditation research. The chapter further

uses the literature to identify and define some recurring key inner values that could be useful for teamwork during DfSI projects. The chapter also defines Awareness-based Meditative Technique (AbMT) and explains the role of AbMT in regulating psycho-physiological stress, which is created due to teamwork during DfSI projects.

Chapter Three: Research Method

The chapter introduces the need for an inter-disciplinary research methodology to undertake this research. The chapter also explains an appropriate AbMT intervention, participant selection criteria and the inter-disciplinary mixed-method research. Finally, the chapter presents a robustly defined data collection process and strategy for analysis of the qualitative and quantitative data.

Chapter Four: Supporting Studies

This chapter presents three studies that support the main research. The first study presents a survey used to gather opinions from expert DfSI practitioners to understand the face validity of the proposed model of inner values. The second study is a peer review to address internal and construct validity of the process of qualitative analysis through inter-rater reliability. The third study presented in this chapter is the usefulness of the ithelete chest belt monitor as a research appropriate tool to measure HRV accurately.

Chapter Five: Context of Data

This chapter describes the profiles of the teams made up of participants selected for this research. It provides details of the DfSI projects that the teams of participants worked on and portrays the teamwork during DfSI project. The chapter explains the appropriateness of selected participants, teams and projects with regard to the research criteria.

Chapter Six: Quantitative data processing, analysis and findings

This chapter presents the processing and analysis of the quantitative data. Quantitative data has been processed to the normal form and prepared for analysis. Applying the analysis process to the processed quantitative data leads to the findings.

Chapter Seven: Qualitative data analysis- peer review and application

The chapter elaborates the themes selected to coarsely divide the data, and presents one instance of the application of the thematic qualitative analysis at a finer level along with details such as the context in terms of design activities and the inner value system. The

chapter outlines the location where the qualitative analysis of the remaining data and corresponding findings can be located in the appendix.

Chapter Eight: Discussion

The chapter provides discussions on the findings from the analysis of quantitative data to reveal the relationship between the physiology and psychology of a person. Then, the discussion of qualitative data compares the teamwork applied by different teams and reveals the design activities and the inner value system. Effects of AbMT intervention on the teamwork during DfSI projects have been discussed by comparing teams on the different themes of investigation. Relevant theories from literature are used to triangulate the relationship between psycho-physiological stress and the behaviour of a person/team.

Chapter Nine: Conclusion and Further research

This chapter presents how the aim and objectives set for this research were accomplished through a review of the literature, building of the research method, data collection and analysis to draw conclusions. This chapter also presents the original contribution to knowledge from this research, the research limitations and possible further research arising to be undertaken. Finally, the papers published during this research are referenced to show decimation of knowledge.

Chapter 2: Literature Review

This chapter firstly focuses the context of this research by exploring the interpretation of the term design adopted for this research, then explaining the activities with regard to design led innovation and lastly defining the context of this research as design for social innovation (DfSI). Then, the need for development of professional practice is understood for team work during DfSI project and possible ways for such development are discussed. Finally, the development of professional practice through awareness based meditative techniques (AbMT) is explained by explaining prior research on effects of AbMT on physiology, then defining the term inner values, identifying the inner values which recur in the literature relevant to context of this research and proposing a model of such inner values.

2.1 Purpose of Chapter

This chapter firstly focuses the context of this research by exploring the interpretation of the term design adopted for this research, then explaining the activities with regard to design-led innovation and lastly defining the context of this research as Design for Social Innovation (DfSI). Then, the need for development of professional practice is understood for teamwork during DfSI project and possible ways for such development are discussed. Finally, the development of professional practice through awareness-based meditative techniques (AbMT) is explained by explaining prior research on effects of AbMT on physiology, then defining the term inner values, identifying the inner values which recur in the literature relevant to context of this research and proposing a model of such inner values. The focus of this research can be visualised as shown in figure 2.1

Figure 2.1: Focus of this research (by Author)

2.2 What does Design mean?

"*The increase in aesthetic demands in the current capitalist market, the adoption of creative industry paradigms in public policy development and the need to adopt instantaneous and internationally recognizable shorthand to convey global market*

imperatives, justifies massive expansion of 'Design' as a profession over the past twenty years" (Aronczyk, 2010).

As the quote above by Aronczyk describes, the traditional activities in design have focussed on the innovative manipulation of products, services and processes so that they are better suited to the needs of the users and the use of such innovations adds novel value to the experience while addressing open complex problems. The eclectic nature of designing to facilitate these manipulations has built appeal for Design as a field of practice in other fields such as Business (e.g. Sanders and Stappers, 2008), Governance (e.g. Dorst, 2011), Information Technology (e.g. Goes, 2014) and many others. As 'Design' is attracting attention and being applied in non-traditional design disciplinary contexts, various interpretations of the term 'design' have created confusion and therefore, it is imperative to define what is meant by the term design in this thesis.

2.2.1 Defining Design and professional practice of design

The term Design, when mentioned in this thesis as a field of knowledge, defines the overarching field of knowledge and the outcomes of the activities of designing. Design is then a proper-noun and therefore begins with capital 'D'. This understanding stems from Papanek's (1985) definition of Design as the outcome of *"...conscious and intuitive effort to impose meaningful order*" where the process of design is "*the placing and patterning of any act toward a desired, foreseeable end*". Papanek states that "*Design is basic to all human activities*" and that "*all men are designers*" (Papanek, 1985, p.3). The work of Papanek (1985) and Whitley (1995) can be said to address designers at this level of collective experience of Design. When Papanek addresses the conscience of the designer, it can be interpreted that he is addressing every person as the designer of the society they live in and appeals to them to make a positive contribution to the society as a whole. Professional designers, thus, are one of the audiences Papanek is addressing and his message could be considered universal. Stemming from this understanding, Design with a capital 'D' in this thesis identifies the body of knowledge, a culture, an attitude that inspires actions to be performed by any person, at any time, whenever the person works toward a change in and betterment of the circumstances.

Jones (1970, p.3) defines the deliberate act of design as *"the initiation of change in man-made things*". It refers to purposeful action through the process of design (designing as an activity), which involves the generation of ideas, judgements, actions and behaviours to

achieve a desired goal (Jones, 1970), and which is guided by a skill set and experience that has been refined and developed by professional design training (Simon, 1969). Such definition represents the act of designing, which is the verb form of the word Design and therefore is denoted by a small 'd' in this thesis. According to Jones, the driving force behind any design activity is not just the functional requirements but also the need for deeper appeal, which creates opportunities to fill a void at a personal, societal or ecological level. What Jones explains here can then be equated to Dorst's (2011) explanation of an "*open form of reasoning*" creating change not only in the 'thing' being designed but also in the 'working principles' that designers use, which leads to some aspired 'value' being created. Mayall (1979) also defines design with a similar perspective and traces back the origin of design to the stone tools designed to meet the needs at the time and the tools in-turn changed human lives and the structure of society as a whole. Based on such observations, Mayall defines design as "*a process of change, an activity undertaken not only to meet changing circumstances, but also to bring about changes to those circumstances by the nature of the product it creates"* (Mayall, 1979, p.121). Therefore, Mayall (Ibid) suggests that during the activity of designing, the designer ought to be conscious of who the user is, how the user will interact with the design, how the design will be used and the intended and unintended outcomes that such interaction would lead to. Following this, the designer should also consider the cumulative effect the design might have on society as a whole. Spencer's (2008) definition, derived from understanding the works of Jones and Mayall, is adopted in this thesis for design with a small 'd', which is: "*The purposeful activity initiated by the recognition of a perceived problem or opportunity, which through the application of energy, skill and resources leads to re-arranging the reality, set against a particular contextual backdrop of broader change, so that the changes facilitate value and benefit to an identifiable quantity of people who come into contact with the changes*". In this thesis the term designer is reserved for professionals performing activities of design with small 'd'. Such professional design practice is used for innovation, solving wicked problems and creating value that cannot be achieved in existing circumstances. However, to a non-designer this process may seem random and a hit-and-miss approach to problem solving. But designers have proven time and again that there is a pattern, a process, a way of thinking which is developed through training and professional practice (Dorst, 2011). With the properly defined understanding of the term design, this research can now be focused to the professional practice of such design-led innovation.

2.2.2 Exploring design driven innovation

Design has many applications and different authors have shared their insight regarding design practice as a process (Schön, 1983; Lawson, 2006; Sanders and Stappers, 2008; Brown, 2009; Dorst, 2011). A simple representation by Sanders and Stappers (2008) (Figure 2.2), depicts how design-led innovation does not have fixed steps, a defined path or established methods and seems random and complex. Such design driven innovation seems to begin with a wide range of activities and gets focused as the project moves forward. Iterations may occur at any time, at any and every phase, which is also visible in the figure. Finally, design-led innovation is not a set of activities making up a process but more of a way of thinking. With this in mind, insights from different authors need to be reviewed to explain the phases of design driven innovation.

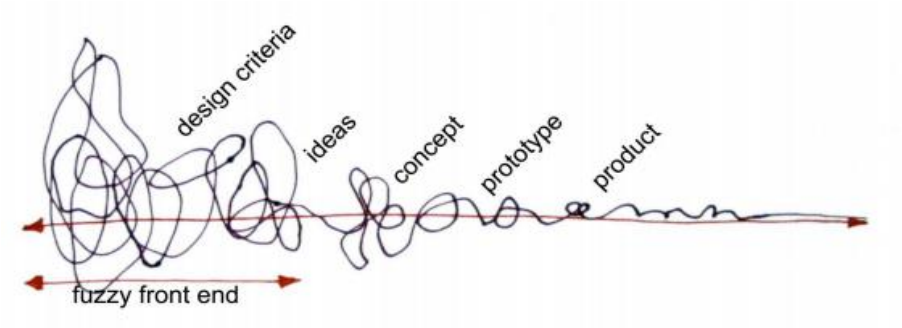


Figure 2.2: Design driven innovation and the fuzzy front end
(Sanders and Stappers, 2008, p.8)

Dorst (2011) explains the mental process of design-led innovation as *design thinking*, a subset of logical thinking for solving problems. According to Dorst, logical thinking (see figure 2.3) considers that innovative 'things' that use some 'working principles' lead to observable results and create some aspired 'value' e.g. a new product marketed in existing ways leads to improved sales, which improves the value offerings of the company brand.

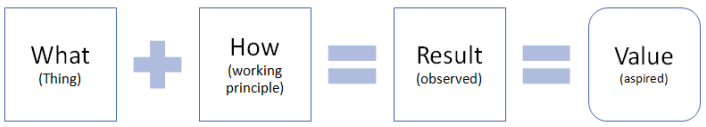


Figure 2.3: Design thinking for wicked problems, adapted from
(Dorst, 2011)

For most common problems the working principles are known while a new thing- objects, processes, protocols, services etc. are created for innovation. Dorst calls this "*closed problem*

solving" which is finding a solution within a fixed set of parameters. This is a useful process for solving problems on a daily basis and could be equated to Design with a capital 'D'. However, Dorst explains that design thinking is needed for wicked problems where the thing to be designed and the working principles that govern the use of such things are both unknown variables. All that is known is the aspired value that needs to be generated and such problems require, what Dorst (2011) calls, "*open forms of reasoning*" which can be equated to design with a small 'd'. He explains that such "*open forms of reasoning*" then requires a "*closed problem solving approach*" for inductive evaluation of the problem and the solution. This involves objective evaluation to understand the reach of the outcomes of the project and subjective evaluations to verify the value generated. He explains that design-led innovation for wicked problem is a logical not random process and expert designers have deliberate and efficient strategies. He adds:

> "*The most logical way to approach complex problem situation is to work backwards, as it were, starting from the only 'known' in the equation, the value that needs to be created, and then adopt or develop up a frame*" (Dorst, 2011, p. 525).

Building on such an explanation of design thinking, the design-led innovation activities can be understood more clearly. Designers or design teams engage in what is called 'Formulation' (Lawson, 2006, p.292) to develop knowledge around the problem and the context. Designers gain knowledge of the problem they are working on, by recognising the 'paradoxes[3]' in the design requirements presented in the design brief and 'naming' them. Such naming activities are recognised to be a key aspect of the design process by many authors (Lawson and Dorst, 2009) who credit Schön (1983). These activities unearth *design criteria*[4] (Dorst and Cross, 2001). Following such naming activities, the problem may be understood from different frames of references or simply 'frames[5]' and such a process is called 'framing' (Dorst, 2011). Such activities lead from themes that designers consider a 'paradox' for looking at the problem and the possible solutions. After or during the creation of frames, the designer or design team externalise their thoughts (usually as pictorial rich

[3] A 'paradox' is the real opposition of views, standpoints or requirements, which requires a renewed framing of the problematic situation. It is a complex statement with two or more conflicting views, both valid on their own, but cannot be combined. Recognizing paradoxes leads to an understanding why the problem is so hard or wicked.

[4]Design criteria is a subtle process of analysis with phenomenological methods that help to understand complex situations in terms of 'themes', which are sense-making tools capturing underlying phenomenon.

[5]A 'frame' is the general implication that by applying a certain working principle we will create a specific value. Framing activity is actually a form of induction, reasoning back from consequences

drawings) and shuffle their understanding to create multiple representations of the situation and paradoxes within these situations. Lawson (2006) names these activities as 'Representing' followed by the rigorous generation of ideas which Schön (1983) calls 'Moving' activities (Dorst, 2013) and Sanders and Stappers (2008) call this the 'Ideation' phase. Lawson (2006) explains that 'moving' towards clarity of the problem and its possible solution leads to an eventual holistic understanding which, unlike traditional problem-solution hierarchies, design problems and solutions do not precede one another but evolve simultaneously as parallel lines of thoughts and yet it requires continuous conscious effort from the designer to bring them together, because they are inseparable and integral to the design process. The goal is to work through the complexity and uncertainty to create the intended value. Such a rigorous iterative process of generating *ideas* to *move* the project ahead is motivated by the philosophy to 'fail fast to succeed sooner' (Brown, 2009). The process of 'moving' is dependent on the frame through which the problem and solutions evolve and as such, can be said to be a set of activities within a particular frame. However, such moving activities lead to new frames or the evolution of existing frames. Dorst (2011) and Lawson (2006) call such process as 're-framing' and identify that this is part of 'reflecting' activities which is again credited to Schön (1983). At this stage designers also need to consider the intended and unintended outcomes generated by the solutions (Dorst, 2011) by recognizing the novelty, clarity and usefulness of frames to the given context (Lawson, 2006). Dorst (2011) warns that value from design-led innovation process does not emerge from the general adoption of design thinking but the application of professional design practice, which has been developed through rigorous reflection. He categorises designers based on the level of expertise and determines that as the expertise increases, designers have existing 'frames' for different problems. Yet they must create new frames and investigate ideas arising from such frames for every wicked problem they attempt to solve through a design-led innovation process. Thus, Naming, Framing, Moving and Reflecting can be seen as the key sets of activities during the design process. This has been represented diagrammatically by Valkenburg and Dorst (1998) in Figure 2.4.

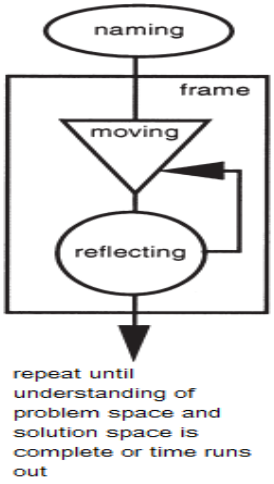


Figure 2.4: Schön's view of design activities
(Valkenburg and Dorst, 1998)

Valkenburg and Dorst (1998) in Figure 2.4 explain that such representation of design is based on Schön's (1983) theory, which helps to understand what the design process is, from a constructionist view of human perception, thought and action. What this means is, the designer is actively constructing a view of the world based on his or her own experiences through action and reflection, "*a kind of knowing which is inherent in intelligent action*" (Schön, 1983, p. 50). Such 'action-oriented', often implicit knowledge cannot be described within the prevalent methodological paradigm of technical rationality (Dorst and Dijkhuis, 1996) and Schön insists that this kind of knowledge is vital for action-oriented professions like design. Thus, the process of design thinking and action is not vague and is developed by rigorous practice and reflection (Dorst, 2011; Lawson, 2006; Valkenburg and Dorst, 1998).

The above understanding of design is based on principles which literature highlights and it is important to recognize that design practice is far too complex and subjective. Firstly, there are different types of design activities such as service design, product design, design for industry, fashion design, interaction design, design for society etc. and they use different approaches to design practice such as; a user-centred approach, a participatory approach, a co-design approach etc. These approaches use different methods, interactions and create different impact and many different categorizations have been attempted in the field of Design research. In addition to the categorisation of design practice by Lawson and Dorst (2009) based on level of expertise discussed earlier, Design can also be categorised by level of impact: form & detail, system, ideology (Young, Cooper and Blair, 2001). Design practice can also be said to have three key layers, namely project, process and field (Bourdieu, et. al., 1999). Further, Hawken (2007) explains that organized design-led innovation is not a

universal truth and that innovation can occur through Design even when people have not planned for it. However, most professional designers consciously bring innovation through design practice which require skills such as

a) project planning, time management and day-to-day activity management which form an important part of design process management (Lawson, 2006; Burke, 2013; Kerzner, 2013),
b) stakeholder management, which may include funding organizations, governmental agencies, third sector institutions and many other private and public sector organizations and individuals (Lawson, 2006; Sanders and Stappers, 2008; Jégou, Manzini, and Meroni, 2004), and
c) team management, which includes building and maintaining productive co-operative relationships with professionals and experts not only from design but other disciplines as well (Lawson, 2006; Stempfle and Badke-Schaub, 2002; Jégou, Manzini, and Meroni, 2004).

All these literatures demonstrate the complexity of design practice that has been explored by design research. The bottom line remains that Design as a field of knowledge has studied and built knowledge around the two-way relationship between people and their environment (Sennett, 2008) and therefore, many people within the design community are motivated by the conviction that "*Design's primary purpose is to help make the world a better place*" (Kusz, 2010, p.29). For example, Papanek (1995) addresses the conscience of the designer and argues that professional designers should spare some time to organise their own activities outside the mainstream market, and seek to make a positive contribution to the society and the environment through their designing. Similarly, non-design professions and organizations are realizing the importance of Design for its usefulness to address wicked social problems (Dorst, 2011). This has led to the term Design for Social Innovation (Manzini and Coad, 2015), which is a specific application of design-led innovation activities for social change. Thus, the context for this research needs to be further focused in the next section from design-led innovation to Design for Social Innovation (DfSI).

2.3 What is Design for Social Innovation (DfSI)

Design-led innovation has many applications from product to packaging, interaction to web design. But designers are concerned not only about solutions but also about the impact these solutions create when a person or identifiable group of people come in contact with them. What makes DfSI different from other applications is the value put on the relationships and on the use and improvement of collective intelligence of a society. Thus,

> *"Design for social innovation is really interaction design in the broadest sense; it is interaction between people that takes responsibility for positive, systemic impact. It can take any and every physical or visible form but it inevitably begins with the invisible dynamics and forces that drive human behaviour. It takes place within the communities and systems it's working with, not outside them"* (Heller, 2015).

Certain recently developed and some old social design practices such as; Inclusive Designing, Universal Designing, Designing for All, Human-centred Designing, Co-Design, Participatory Designing, DfSI, etc. fall under the umbrella of design engagement for social causes in different meaningful and instrumental ways. These practices try to unearth a relationship between designing and social change by the holistic understanding of various needs, interpretations and personal worldviews. Such paradigms have given birth to new ways of thinking about governance, social innovation, the third sector and to a certain extent the private sector. Thus, DfSI has gained importance in a variety of fields such as; educational institutions (e.g. ISTEAD, Stanford etc.), government organizations (e.g. the US Social Innovation Fund, Social Innovation within the European Horizon 2020 Flagship Initiative, "The Innovation Union"), third sector non-profits (e.g. the Young Foundation, the Centre for Social Innovation Toronto, and the Centre for Social Innovation Vienna etc.) and more recently a growing section of the private sector. Such initiatives are not only interested in social innovation within their organization but also with the community that they exist in and work with. However, if social innovation is so important, then it is hard to ignore Pol and Ville's (2009) criticism that: "*It is an open secret that the term 'social innovation' is used in various and overlapping ways in different disciplines*", and that such a lack of definition reflects in the projects and their outcomes. Thus, defining what is meant by social innovation

becomes critical not only for focusing the context of this research, but also to ensure that data is collected from the most appropriate projects.

2.3.1 What is meant by Social Innovation project?

Social innovation has been criticised to be weakly conceptualized, because of pre-dominant literature focusing on policy rather than practice (Cels, et al., 2012; Bates, 2012; Mair, 2010; Mulgan, 2009; Goldenberg, et al, 2009; Howalt and Schwarz, 2010). Certain authors attempt to define the terms social and innovation separately. For example, Bestuzhev-Lada (1991) mentions that two interpretations of the word 'social' exist, the first is 'societal' as opposite of technological, financial and political and second is 'sociological' which refers to relationships in social situations. Another example is from Franz (2010) who focuses the term 'social' as an opposite term to 'asocial' and is normative and aims to satisfy the needs of underprivileged groups of society. Similarly, the term 'innovation' in the context of social change has been defined as, "*deliberate interventions designed to initiate and establish future development concerns*" (Howalt and Schwarz, 2010, p. 2). Thus, social innovation could be said to refer to the activities that aim to build new social collaborations while focusing on bringing social change by solving certain social problems or exploiting social opportunities. The criticism here is that such a definition would be a crude and simplistic understanding of the complex process of social innovation. To explore this complexity many authors (e.g.: Mulgan, et. al. 2007; Rüede and Lurtz, 2012; Hedén and King, 2013) have adopted Dedijer's (1984) differentiation of definitions for social innovation. He differentiates the definitions for social innovation into three categories:

1) Intention based definitions that explore "What needs to be created" (e.g. the definitions may focus on people who can create change or determine the intention of activities being focused towards social development.).
2) Methods/Tools based definitions that focus on "How can it be created" (which are further differentiated as approaches/methods being imported versus created, trial and error versus systematic search, strict regulations versus encouraging engagement etc.).
3) Outcome based definitions that focus on "What is created" (e.g. something new is created such as a virtue, a norm, a code of conduct, a law, a social network or an organisation, a pattern of behaviour etc.).

The categorisation helps by providing a structure for analysing different social innovation projects. There are many categorisations but Dedijer's is used as a structure for this research

because it provides an appropriate structure for analysing social innovation during this research. Some of the other categorisations are also mentioned below but Dedijer's (1984) categories form a starting point to build a discussion on defining social innovation.

Using the Dedijer's categorisation, various definitions can be evaluated to derive an appropriate understanding of social innovation projects. Beginning with definitions that focus on the intention of the project, Mulgan et al. (2007, p. 7) describes social innovation as a process of, "*generating new ideas that work to meet pressing unmet needs and to improve peoples' lives*". In this definition, novelty has been highlighted and at the same time the emphasis also lies on the goals that have been pre-decided along with the intention to improve people's lives by bringing social change. Kesselring (2009, p. 99) also captured the essence of social innovation as; "*the elements of social change that aim to create new social facts, which can impact the behaviour of individual people or certain social groups in a recognisable way, with an orientation towards recognised objects that are not primarily economically motivated*". Thus, the definition portrays a project that begins with an aim to create social change for non-economic betterment of society. According to the definition, economic outcomes could be a complementary goal for sustenance of the project but cannot be a primary goal for social innovation projects. In a recent critique of the definitions focusing on the intent, Grisolia and Ferragina (2015), mention that having an intention does not always mean being able to create change. For example, they warn that most projects that start with the intention of social innovation, could end up being influenced by their funding organisations to the point that they become commercial projects driven by economic goals. Thus, the definitions of social innovation projects based on the intentions of non-economic social change for the betterment of people, is clearly not enough to get a complete grasp of social innovation projects.

On the other hand, Hochgerner (2009) highlights the importance of developing methods, tools and techniques that can aid the creation of social change during social innovation projects. He defines social innovation as, "*the creation of new concepts and measures that are accepted by impacted social groups and are applied to overcome social challenges*". The definition gives importance not only to the methods, tools and interventions created during social innovation projects, but also to the people affected by them. The definition highlights an important aspect that social innovation projects are truly successful only when the community affected by the change are comfortable with the methods applied to bring about

the change. It is not just the methods that are being applied that are important. Brooks (1982) categorises social innovation projects further based on innovating agents such as; market innovations (where market change creates social opportunities e.g. movement from material to information), management innovations (where change in methods of managing people or things create social change, e.g. movement from carrot and stick management to collaboration), political innovations (where policy level changes lead to social change e.g. summits paving paths to laws) and institutional innovations (where people help themselves by re-organising themselves into institutions such as self-help groups). We can note that since Brook's description, there has been a growth in technology, changes in societies and evolution in the methods of application of social innovation. These have made the definition of social innovation based on the use of methods to become more complex and vivid. The factors to categorise social innovation projects have continued to grow over the last twenty years and thus, focusing on agents of change and methods of creating change is just not enough. To define social innovation with a focus on methods is an evolving process, which would require a review every few years (Pol and Ville, 2009).

While defining social innovation, Simms (2006, p. 388) brings attention to the outcomes and defines social innovation as changes in, "*the* [human] *structure and organization"*, as an extension to Merton's (1968) definition, which is:

> "*What is in essence the impact of innovation can be observed on the level of social behavioural patterns, routines, practices and settings. This, and not on the level of material production, is where the decisive new combination of* (social) *factors and the pursuit of socially recognized goals with different means occurs where social innovation is concerned.*"

Thus, the above review of literature shows that while defining social innovation, the importance should be on;

- the intentions for social innovation at the beginning of the project (with any economic achievements as one of the goals, but not as the only or primary goal) as well as,
- the tools and methods that define appropriate techniques for creating social change (that are acceptable to the people they change) and also,
- the eventual outcomes created, which should be a change in a person or an identifiable group of people.

Such a definition has been used by the Board of European Policy Advisors (authored by Murray, et. al., 2010, pg. 5) explains social innovations as:

> "*Innovations that are social in both their ends and means. Specifically we define social innovations as new ideas (products, services and models) that simultaneously meet social needs… and create new social relationships or collaborations. They are innovations that are not only good for society but enhances society's capacity to act*".

This definition and understanding of social innovation projects has been adopted during this research and has been used while selecting the appropriate research case study projects for participants to work on.

2.3.2 Key issues with DfSI projects and role of designer

Design for Social Innovation or DfSI, by definition, is not driven by monetary profit as the main motivation during design-led innovation projects. The goals of every DfSI project can and do vastly vary, while commercial design-led innovation projects stay focused on profit as one of their key goals. Further, DfSI does not create a one-off solution, as is the case in many other design disciplines, and it creates legacy and structure for community to engage with. Therefore, one of the key roles of the designer during DfSI projects is that of a motivator (Sherwin, 2012).

Social innovation projects are aimed at a society of people either defined by their geography, or their economic bracket, or other such criteria that does not define the beneficiaries of the project as a fixed set of people (Manzini and Coad, 2015, p.36). Similarly, due to the lack of a proper boundary, identifying stakeholders while working on DfSI projects is difficult and may include a wide variety of people and institutions ranging from local government to NGOs to local businesses working within/for a community (Kothari in Cooke and Kothari, 2001). The stakeholders in such scenarios have their own agenda they would want to achieve through the projects, and Manzini and Coad (2015, p.36) point out that this is problem for designers because "*various groups of actors working on different issues have different expectations of what design can do"*. Similarly, the users, who are ultimate beneficiaries of the project, also have their own vision of the outcomes of the project. Thus, getting everyone to focus on a common goal is one of the difficult responsibilities of the designer as a leader during a DfSI project (Sanders and Stappers, 2008).

Contemporary practices within a society are not fixed but continuously evolving. Therefore, bringing cultural change and measuring the impact of DfSI projects is very difficult because of the poorly-set boundaries where change is intended, unidentified people and relationships are impacted, and there are no fixed criteria for comparison. These factors add to the complexity of any and every DfSI project. Facilitation forms an important aspect during DfSI projects, where the designer as facilitator has to make sure that the stakeholders involved are participating on their own accord, share the common goal of the DfSI project and work *WITH* community rather than *FOR* them (Thorpe and Gamman, 2011). Such facilitation is increasingly difficult because during design, the problem space and solution space co-evolve and therefore require designers to develop professional practice through reflection-in-action (English, 2009). Lawson (2006, p.26-29; 2009, p. 42) also puts responsibility on the designer to bring the clarity of thought and define appropriate design questions, select suitable methodologies and clarify the boundaries and goal of the design activity. Thus, when the complexity of DfSI projects arises from undefined boundary, vaguely defined users, unknown stakeholders, multiple intentions and agendas, undefined success criteria etc., then the designer or design team in a DfSI project needs to be a leader, facilitator, project manager, advocate of different opinions, a researcher, activist, and also a designer. DfSI can be applied by a single designer, but to cope with the complexity, usually a team of designers or multi-disciplinary experts are used to conduct the project. This brings the focus of this research to teamwork during DfSI projects, which is discussed in the next section.

2.3.3 Need for teamwork during DfSI

Teamwork has become extremely important, not just in DfSI but every field. The reason for this is explained by Lehrer (2012) as:

> "*A hundred years ago, the Wright brothers could build an airplane all by themselves... Now Boeing needs hundreds of engineers just to design and produce the engines. The larger lesson is that the increasing complexity of human knowledge, coupled with the escalating difficulty of those remaining questions, means that people must either work together or fail alone."*

He explains that the growth in research and technology has led to rapid generation of information to such proportions where one mind cannot hold it on its own. Therefore, different experts have to collaborate not only with other designers but also with experts of other disciplines such as researchers, developers, stakeholders and (potential) users—who are

also experts, that is, "*experts of their experiences*" (Sanders, 2005). In the context of design, Atkinson (2010) explains this as challenging the disciplinary boundaries and claims that "*There is a developing awareness of the interconnected nature of design, its connections with other disciplines and the convergence of different design disciplines as boundaries are increasingly contested and transgressed.*" During DfSI, the designer is not a bystander or facilitator, the designer is right in the middle of it, getting his or her hands dirty to gather inspiration and the ideal direction to proceed into development. Thus, the designer applying a design process needs to frequently switch mind-sets while performing various tasks. A designer in DfSI takes up many different roles which require different skillset and mindset. The switch between different roles, and subsequent mind-sets, can be made easy by using teams instead of an individual designer (Roschelle et. al., 1995). Such teams may either be made of all designers or can be a multi-disciplinary team of experts who can take charge of the different roles effectively. Thus, it is essential to understand what is meant by the term team during this research.

A team has been defined and understood in relationship to the importance of a common goal and the importance of cooperative working of a group of people. For example, Thompson (2008, p.4) explains that, "*a team is a group of people who are interdependent with respect to information, resources, and skills and who seek to combine their efforts to achieve a common goal*" or Katzenbach and Smith (1993) defines, "*a team is a group composed of a limited number of people who have complementary abilities, a common goal, performance objectives and collective approaches and that they deem one another as mutually responsible*". Such definitions come from a universal understanding of teams. With regard to teams in design, Cross and Clayburn-Cross (1995) made observations that, "*the social process of design interacts significantly with the technical and the cognitive processes of design*". Badke-Schaub and Frankenberger (1999) also studied teamwork during design from a social point of view and emphasise the importance of co-operation and communication within teams during the entire design process where designers work '*with'* other team members instead of working as an independent part of the whole. Such views have been studied by many design researchers and they highlight the importance of collaborative work. Valkenburg and Dorst (1998) identified need for synchronising understandings and activities during collaborative design. Similarly, Zahedi (2011) presented the idea of co-reflective practice to describe how an interdisciplinary team creates a common language, exchanges knowledge and co-constructs new knowledge. Dorst and Cross (2001) recognise that collaborative work within

design teams is important yet difficult specifically because, the co-evolving problem space and the solution space necessitates the team members to take different directions during problem framing, scoping and finding solutions (p. 436). Nemeth (2012) proved that "*debate and criticism do not inhibit ideas but, rather, stimulate them relative to every other condition"* (p. 363) and they propose a need for professional ability in design teams to be able to handle such "*dissent*". Thus, teamwork in design goes beyond co-operation and requires collaborative work and abilities which transcend traditional abilities to work within teams. Extending the understanding of design, Sanders and Stappers (2008) explain that the term, design teams, are not a single unit of designers or multi-disciplinary experts, they are also part of a bigger whole and they work with other stakeholders and users. They encourage such working 'with' rather than 'within' the larger whole and call it co-design.

Thus, the understanding of the term 'team' during this research is;

- a group of people (with at-least one designer[6]) applying the design process to co-evolve problem space and solution space (as described by Dorst and Cross, 2001),
- where team members can develop effective, mutual relationships within and outside the group of experts assigned to the DfSI project (as explained by Sanders and Stappers, 2008), and
- where team members build a cooperative environment that helps build common intention and collective innovation through the sharing of knowledge and skills.

During this research, the goal for such teams is social innovation.

Stempfle and Badke-Schaub (2002) explain that in order to successfully solve a design problem, designers not only need to deal with the design task itself, but they must also allocate a part of their efforts towards structuring and organising the team for the design process. Desserti and Rizzo (2014) highlight that a team approach in design (as well as the use of the multi-disciplinary team during design) brings forth a need for designers to advocate their design decisions to their team, even when the solutions are not ready. Designers, in the team environment, rarely have the power or independence to be solely 'responsible' in terms of the design decisions that are made (www.designagainstcrime.com). Thus, designers are supposed to be in-charge of design decisions but a designer is not always in a position of

[6] Because this study is looking at teamwork in DfSI projects, the natural focus of this research is in teams where at-least one team member comes from a professional/educational design background

authority to take such decisions and the power hierarchy takes precedence, which affects the design process. McMillan, Wright and Beazley (2004, p.25), warn that in design teams, members need to be aware that subjective perspectives may lead good designers to become ego-centric in their approach during design practice, which is not a healthy environment for teamwork and for applying design during social development projects. Hans (2014) highlights that design teams need to go beyond the norms of traditional leadership theories and proposes authentic leadership, a concept by Avolio, Gardner et al. (2004), where every member of the team embodies the aspects that involve inclusivity and collaboration but also a genuine moral growth during professional development. Such authentic leadership addresses ethics which designers need during teamwork for DfSI projects. But designers need to go beyond own ethical behaviour and need to become inclusive.

When design teams create design solutions within teams or co-create with stakeholders and users, they must be capable of drawing together everyone involved towards a common intention so as to achieve collective innovation. But, researchers within social science studying social innovation projects have recognised that; citizenship, politics (Stacey, 2007), representation, transformation (Mohan, 2001), governance, citizen-state engagement (Taylor, 2001), ethics (Avolio, Gardner et al., 2004) and power relations (Cooke in Cooke and Kothari, 2001, p. 118), hinder the creation of common intentions and collective innovation. During such a study of social innovation projects, critiques have generally focused on differences in the; definition, objectives of participation, applicability and appropriateness of techniques and tools (Nelson and Wright, 1995). However, Cooke (2001, p. 6) explains that this is a limited critique and brings focus on the more important ability of "reflexivity", and promotes teams being collectively, "*cognizant of the issues of diversity and differentiation*". Scharmer (2010, p.2) brings to light that, in multi-disciplinary environments, "*the challenge of missing collective leadership*[7]*",* is becoming more apparent during the long process of problem solving. Such missing collective leadership is the research problem for this study. According to Kothari, (2001, p.142), due to the lack of collective leadership, project decisions do not remain co-owned and become biased. This missing collective leadership stems from multiple perspectives of different team members, various stakeholders and users,

[7]Collective leadership becomes possible when the members of a group, motivated by a common purpose, begin to build relationships with each other that are genuinely respectful enough to allow them to co-construct their shared purpose and work. This is about expanding from solo perspective of "I" to include the "We" (www.ethicalleadership.org).

which may lead to the neglect of important aspects of socially responsible design (Kothari in Cooke and Kothari, 2001, p.142). Whitley (1993, p. 94-97) examined this problem of multiple intentions affecting social development projects and recognised that it is the designers' responsibility to guide others involved in the project through proper leadership. Thus, there arises an urgent need for designers to become professionally empowered with new skills to be able to work within teams for DfSI projects.

2.3.4 Design approach to professional development

In the context of Design, the development of professional practice is associated with reflective practice, where experience alone does not necessarily lead to learning; deliberate reflection on experience is essential. The process of reflection changes the inner value system because skills and inner values are related in the way an artist or a designer manoeuvres across the artefact or idea (Lawson, 2006, p.131). To explain such an action and reflection process, Argyris and Schön (1974) made a distinction between the two contrasting theories of action. The distinction is between those theories that are implicit in what people do as professionals, and those theories that people use to describe their actions to others. The *theories-in-use* are tacit structures governing the decisions, behaviour and actions of the professionals. Their relationship to action was described as "*the relation of grammar-in-use to speech; they contain assumptions about self, others and environment – these assumptions constitute a microcosm of science in everyday life*" (Argyris and Schön, 1974, p. 30). The theories used to convey what a professional would like others to think they do, has been called *espoused theory*. The gulf between espoused theory and theory-in-use always exists and is not a bad thing according to the authors. However, if it gets too wide then there is clearly a difficulty in understanding one's own actions properly. Providing the two remain connected, then the gap creates opportunities for growth through reflection. To bridge this gap, there are two learning strategies suggested by Argyris and Schön (1974) shown in figure 2.5.

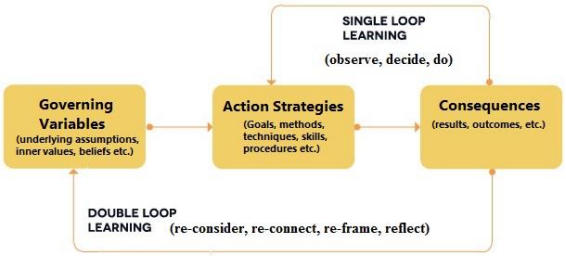


Figure 2.5: Single and Double Loop Learning Strategies (Adapted from Argyris and Schön, 1974).

When organizations, groups of professionals, teams or an individual focus on the improvement of their action strategies alone, it is called *single-loop learning*. The change occurs in the action strategies due to the activities of "*error detection and correction*" (Smith, 2013), and some of the consequences of single-loop learning are "*defensive relationships, low freedom of choice, reduced production of valid information and little public testing of ideas"* (Argyris and Schön, 1974, p.89). When organizations, groups of professionals or an individual focus on improvement of the governing variables (inner values) as well as the action strategies, then it is called double-loop learning, which involves "*questioning the role of the framing and learning systems which underlie actual goals and strategies*" (Usher and Bryant: 1989, p. 87; Smith, 2013). Some of the consequences of double-loop learning are minimum defensive relationships, high freedom of choice and the increased likelihood of valid information. What these theories propose is that, learning is more holistic when the change takes place in the inner values of a person or a group, along with their action strategies. Such double-loop learning creates consequences which have been recognised as favourable for teamwork during DfSI projects (Payne et. al., 2008). However, it is noted that every professional or group of professionals have both single and double loop learning and the aim is to have more double-loop learning for a more holistic learning experience.

During such growth and development, the learning mechanisms employed have been driven by the interactions, either interaction with other people (learning by participation as explained by Platts, 2013) or interaction with the surroundings (learning by acquisition as explained by Sfard, 1998) or even interaction with self (learning by reflecting as explained by Schön, 1983). To achieve competence and excellence, one needs to have the capacity to learn not only by acquiring knowledge and skills, but also building the right attitude within oneself. For example, interacting with rock, the attitude of a sculptor is different to that of a layman (Schön, 1983). Such attitudes are said to arise out of core inner values and beliefs. While beliefs are assumptions and convictions that are held to be true based on past experiences, inner values are the worth of things, concepts and people in the mind (Thompson, 2013, p. 34). Collective minds of people lead to terms such as family values and values of society. The practice of such inner values over a period of time form a culminated effect called 'Virtue'. For example, the Virtue of benevolence is said in the Quran to arise from the inner value of generosity demonstrated by the action of charity of alms. (The Holy Quran, an-Nahl 16:91). These internalised systems determine the actions that make up the behaviour of a person (Perloff, 2010, p.92-101). Thus, the inner values of a person or society are crucial for the

development of co-operative efforts and evolution. However, developing inner values is not explicitly possible because there is no well-defined set of inner values. The inner values are culturally and subjectively relative. Thus, even when two people say they value freedom, each has a different conception of what freedom means and each would use their idiosyncratic concepts to act differently. Values are often intuitive and tacit. There are no objective grounds to define, let alone quantify inner values. They often conflict with each other in specific contexts, such that individuals must juggle and prioritize values, often in an ad-hoc and logically inconsistent way (Sensen, 2011). Thus, an individual is rarely aware of all of the values he/she might believe to be good or bad, and thus, many individuals are not able to fully articulate or rationalize their inner values. Therefore, Schön (1983) highlights the importance of reflective practice as an important tool in practice-led professional learning that arises from and leads to enhanced understanding of one's own professional experiences and the development of awareness of one's own belief systems, or what is called the inner value system during this research. Reflection is the act of looking at one's actions and reactions, thoughts and emotions and understanding the nature of experience as opposed to a mere recollection of events. Thus, reflection adds to the knowledge of a person as it is an act of becoming aware (Schön, 1983, p. 231). So the reflective practitioner is becoming aware of what is inside (emotions, experiences) and what is outside (actions and responses) and also what knowledge lies in the interaction of the inside and the outside. And through the act of becoming aware, the designer achieves double-loop learning and changes the inner values along with actions arising from them. If the reflection process should lead to awareness, then it is important to understand what is meant by the act of becoming aware.

2.3.5 Philosophical understanding of the act of becoming aware

The construct of modernism can be said to have developed from Heidegger's (1958) explanation of doing (physical engagement with the world) and reflection (mental engagement over the actions) (Giddens, 1991). Heidegger explains that a human being is not an isolated world-less subject, but is an entity, which in its very essence is constituted by its world. It is our way of being in the world that implies that we are constantly acting (or in Heidegger's terms 'thrown') within some situation. Because of this, Heidegger suggests that doing is more fundamental to understanding than reflection and that reflection happens when there is a breakdown in action. As an example, Heidegger suggests that 'when hammering you are involved in the activity of hammering and not in reflection on the hammer and reflection comes in when a breakdown in the activity occurs' (Heidegger, 1958). Such

interpretation is too restrictive and it is more appropriate to suggest that reflection exists in the activity of hammering all the time (Vyas, et. al., 2013). In fact, the hammerer is tacitly aware and reflecting (moment by moment), at least on the current outcome of the activity, and adjusting his actions accordingly. This is why the reflective practitioner is becoming aware of what is inside (emotions, experiences) and what is outside (actions, and responses) also, what knowledge lies in the interaction of the inside and the outside. And through this act of becoming aware, the professional growth occurs (Schön, 1983). Thus, it can be argued that both doing and reflecting are equally fundamental to the human way of being and, therefore, cannot be separated or ordered in priority of being more or less fundamental to human understanding. Such reflection in action has gained importance in the last two decades preceded by Schön's (1983, p. 1-75) efforts to develop reflection-in action as a way to embed professional knowledge into practice. Thus, doing and reflecting are inseparable from the process of knowing and it should be realised that there is another form of action that (although often unappreciated within Western culture) is equally important to knowing the World: the action of examining personal experience, or as Varela puts it, 'the act of becoming aware' (Varela, 1993; Depraz, Varela and Vermersch, 2003). Eastern traditions such as Buddhism, Daoism, Hinduism etc., have developed the act of 'becoming aware' as a part of their meditative practices and as a way of life. However, in the Western culture, exploring personal experience has been neglected as an action fundamental to being and knowing. This neglect, however, can lead to a false fragmentation, since it is now understood that awareness, feeling and reasoning are very much interrelated (Varela, 1993). Our experience of the world is born in our interactions with the environment and these are validated by our embodiment (Sice and French, 2004). These experiences represent an irreducible first-person ontology (Searle, 1993). Thus, we cannot explain experience 'on the cheap', by assuming a third person or objective viewpoint (Varela, 1993). What is required is to recognise that both first-person and third person accounts, and their interplay, are necessary in order to do justice to the quality of our knowing. This is where many philosophical investigations of experience have had difficulty, since in general they deal with the issue of exploring human experience as one of pure reflection (Chalmers 1995; Heidegger, 1958).

Enactive cognitive science points to an alternative: What is needed, is a disciplined act of cultivating our capacity 'of becoming aware' of the sources of our experience and, thus, opening up new possibilities in our habitual mind stream. In Varela's work (Varela, 1993;

Depraz, Varela and Vermersch, 2000; 2003) this action of becoming aware is punctuated by three ‘gestures’:

1. Suspension - a conscious transient suspension of beliefs about the thing being examined.
2. Redirection - turning one’s own attention from the object to its source, backwards toward the arising of the thoughts themselves.
3. Letting go - changing one’s attitude from looking for something to letting it come

Action in terms of ‘doing’ or ‘reflection’ is an activity of the actor toward or in response to the environment. The act of becoming aware, on the other hand, is one of uniting, connecting with what is inside (to self and body) and with what is outside, i.e. being part of the environment, experiencing being part of the universe. Such an act of becoming aware is being studied, researched and proven to be useful by many authors (Bucke, 1991, p.27, Tolle, 2001, p.46-49; Kabat-Zinn, 2003, p. 2; Scharmer, 2010, p. 5-7; Shear and Varela, 1999). They suggest that consciousness of the ‘self’ is affected by and can bring about development in the practice of reflection and therein improve the quality of human behaviour in group contexts. Philosophically the ‘self’ is considered the being, which is the source of consciousness; the agent responsible for an individual's thoughts and actions; and/or the substantial nature of a person, which endures and unifies consciousness over time (Schön, 1983, p. 17; Bucke, 1991, p.21; Tolle, 2001, p.46-49; Kabat-Zinn, 2003, p. 2; Scharmer, 2010, p. 5-7). Thus, it can be postulated that awareness of the ‘self’ is necessary to limit problems such as the clash of egos in teamwork during DfSI projects. Maslow (1993, p. 365) proposes a spectrum of transcendence for self-actualisation, which is a state of consciousness of ‘self’ and of responsibility for ‘self-development’. However, to achieve the transcendences is a subjective choice (Maslow, 1993, p.367). Tolle (2001, p.10-17) proposes self-observation, which means being present and aware of emotions and reactions of ‘self’ without any self-judgement. The awareness of self has been given importance yet, the definition of awareness-based practices is very limited. However, such research and literature demonstrates that various awareness-based techniques have been considered effective and popularised over the last century and it is important to understand the inspiration of such research published in the literature.

According to Dryden and Still (2006), World war II marked the intellectual exchange of Eastern ideas of awareness and contemplative practices when western physicians, scientists and philosophers started exploring Eastern cultures, predominantly Japanese culture (Zen),

Chinese (Taoist and Buddhist) and Indian (Buddhist and Hindu). The manifestations of eastern philosophy and teachings on the western psychotherapists and psychiatrists led to early citations of Zen-informed psychotherapy and Buddhism-informed mindfulness practices. Dryden and Still (2006) bring to focus the Zen-informed psychotherapy of Shoma Morita, "…*which reversed the Western medical approach of attacking the symptoms. Instead, he taught patients to accept symptoms, such as anxiety, with calm awareness.*" Such philosophical influence led to conceptual changes in psychotherapy and psychiatry and modified not only the approach and methods of treatments but also influenced the culture of psychiatry drastically (McCown and Reibel, 2009). The influence of eastern understanding started with medical professionals but quickly spread to aesthetics, arts, literature, poetry, music and even spiritual practice. Some important examples highlighted by McCown and Reibel (2009) include the influence on Christian contemplative practice by the Trappist monk, Thomas Merton, the influence of Eric Fromm on Psychoanalysis and the influence on art and music by composer John Cage (e.g. respectively; Merton, 1968; Suzuki, Fromm, and De Martino, 1960; Cage, 1966). Such repackaging was also seen for Taoist meditative practices in the form of Chi Gong and Tai chi (Russell, 1952), for Buddhist practices in the form of Mindfulness meditation (Thera, 1962) and for Hindu practices in the form of Transdental meditation (Yogi, 1960) and Raj Yoga (Macshane, 1964). Thus, awareness seems to have its roots in contemplative and meditative practices. Therefore, awareness has been referred to as "the heart" of the meditation process (Thera, 1962) and not just as the outcome from it. Varela's enactive cognitive science explanation of 'the act of becoming aware' aligns with this premise of awareness being based in meditative practice, and this premise has been accepted during this research when studying awareness. During this research, Awareness-based Meditative Techniques have been abbreviated to AbMT for convenience and to indicate that awareness is the basis of the practice of meditative techniques as well as an outcome that brings further benefits to the current conditions: physically, mentally and socially.

This premise has been studied in leadership theory as proposed by Scharmer (2010, p.6), where awareness can be achieved through 'presencing', a state of being aware of 'self' in the present moment (present sense of self). Similarly, according to Tolle (2001, p.171) awareness can be achieved by reflecting on the present conditions and creating actions based on the reflections. Scharmer (2000, p.6-28, 2010, p.6), advocates that aware leaders build an open mind, open heart and open will to overcome missed opportunities for collective leadership.

His model of innovative leadership, also known as *the model of the U* (Scharmer, 2000, p.6-28, 2010, p.6) embeds reflection, awareness and mindfulness in the concept of open mind, open heart and open will. This premise is also accepted in clinical psychology, psychiatry and neuro-science, where awareness-based meditation has been proven to affect clinical psychology and creativity positively (Kabat-Zinn, 2003, p.144). Jon Kabat-Zinn introduced the practice of Mindfulness rooted in Buddhist meditation, to bring attention from the outer to inner being and has seen its application in the field of pain management, addiction management, cognitive therapy and many other fields. Similarly, in psychiatry, Daniel Siegel's (2007) *Wheel of Awareness* is an active practice without moving the body, with a sense of attention and purpose, made up of a series of exercises focusing attention with the background of breathing awareness practice to come to an inner place of clarity. From a Neuro-Science perspective, Richard Davidson compared fMRI (functional Magnetic Resonance Imaging) scans and PET (Positron Emission Tomography) scans to determine the physical effect of meditative practices on a person based on the level of his/her awareness. His work with the Dalai Lama and other Buddhist experts has brought recognition to the research of awareness in the field of neuroscience. Thus, effectiveness of awareness has been proven to create positive change in physical and physiological aspects, which in-turn aids the social and behavioural aspects, which are recognised to be useful in leadership studies. The exact nature of such physiological change is explained later in section 2.4.1. However, what remains of interest during this thesis is the usefulness of such AbMT practice in teamwork during DfSI projects. The reason for such exploration of AbMT lies in the recognised interest that Design is a field of knowledge exploring the intersection of science and spirituality as one of the primary means for creating the paradigm shift that is required within organizations, teams and at individual level (Sanders and Stappers, 2008). The change desired is the one, "*in which both science and spirituality reconfigure our most basic understandings of human consciousness and how to live harmoniously in a healthy and sustainable ecosphere*" (Institute of Noetic Sciences, 2007). In 2009, Young and Spencer (2009, p.3) made an urgent call that the role of awareness in reflective design practices needs to be made more explicit for multi-disciplinary design environments and that this should be explored further for moving beyond rational theories and dealing with the complexity and ambiguity that social innovation projects face.

This section has looked at the act of becoming aware from a philosophical point of view, exploring its usefulness as proven by certain disciplines and yet, the rising need to explore the

usefulness of such ‘act of becoming aware’ in the field of teamwork for DfSI. However, before exploring the application, it is important to understand what is meant by awareness during this research.

2.4 Understanding awareness

Awareness has been defined by different authors differently. The early citations occur in the work of Thera (1962) who explains awareness as, “*a clear and single-minded consciousness of what actually happens to us and what happens within us at the successive moments of perception.”* Different definitions of awareness have since occurred within the premise of AbMT, because experts in different fields have varied interpretations of the different ancient traditions they studied and followed. Goleman (1977) undertook extensive research studying a variety of spiritual traditions with different awareness-based meditative practices. He articulated an understanding of the techniques, the corresponding mind-set and the mode of being that could facilitate not just improvement but a transformation of individuals, groups and societies. According to Goleman, awareness-based meditative practices are predominantly of two types, *concentration-based* and *insight-based*. Both these techniques enhance awareness, but in two very distinct ways. Concentration-based meditation focuses the attention to a single object, such as breadth or a thought or even a chant, and helps to avoid distractions. Such meditation, according to Goleman, is appropriate for beginner’s and low level practitioners of meditation. Insight-based meditation brings attention to every experience arising and practitioners become aware of every sensory perception, usually starting from the most dominant such as sight and touch to less dominant ones such as taste, sound and smell, to the sphere of thoughts and emotions where sensory perceptions are made. Insight-based meditation, usually requires a more stable attentive state of mind and Goleman points out that such techniques are usually practiced at expert levels. Goleman points out that these techniques are interrelated, and that concentration-based meditation informs insight-based meditation and together they create awareness. Highlighting the importance of awareness-based meditation, Goleman reports, “*Our natural tendency is to become habituated to the world around us, no longer to notice the familiar. We also substitute abstract names or preconceptions for the raw evidence of the senses*” (p.20). He explains how focusing attention can create an awareness that helps in facing what he calls “*bare facts*”. Thus, Goleman emphasises the importance of meditative practice as the core to

developing a state of awareness. He also explains that regular practice, preparation and endless repetition is required to reach and maintain the state of awareness.

Since Goleman's research, many studies have explored different ancient traditions and tried to build an understanding of awareness enhancing techniques and to explore the potential impact of regular practice of such techniques. One of the more rational definitions of awareness arising from such researches is that awareness is a "*state of psychological freedom that occurs when attention remains quiet and limber, without attachment to any particular point of view*" (Martin, 1997). On the other hand, Baer (2003) states that; awareness is related to particular characteristics of concentration and attention that can be cultivated and sharpened through practices such as meditation. However, such definitions have not become as popular as the definition from Kabat-Zinn (2003), which states awareness is; "*...paying attention in a particular way: on purpose, in the present moment, and non-judgmentally"* (p.144). Jon Kabat-Zinn calls such awareness-enhancing practice as Mindfulness. The definition establishes that awareness is a state of mind, a 'self' with certain characteristics and this definition has been adopted to define awareness during this research. This awareness can be consciously achieved, through regular practice of certain meditative techniques, just like muscles developed through regular exercise or perception built through regular study (p.146).

The state of awareness inhabits the core teachings of the Buddha, Hindu Yogis, Chinese monks and Mayan priests (Gunaratana, 1992; Hanh, 1999; Nanamoli and Bodhi, 1995). However, awareness is not only an individual's state of mind, but also of groups, teams and of society. The collective aware state has been described by the Sanskrit word *dharma,* which carries the meaning of *lawfulness* (individual as well as collective). The morality and ethical aspects of the word dharma do not depend upon legality when lawfulness is mentioned. Instead, the concept of dharma has been revered as, "*the way things are*", similar to the way physicists revere the laws of physics or the Chinese notion of *Tao* is revered. Such single-minded contemplative investigation towards insights and a holistic view of human existence, along with an understanding that the way of life is the "medicine" for treating fundamental "dis-eases" becomes the very nature of AbMT practices. Such a specialised nature of practice is not always required and decisions depend on the context of research. Scientists have adopted the essence of certain religious teachings and have studied the techniques arising from those teachings. However, there are number of techniques to choose from and though

they are based on the same moral values, the techniques are different and require certain choices to be made by the practitioner. Thus, there is a need to understand different research carried out on AbMT so as to select the correct AbMT for this research.

Researchers have used different AbMTs to create change. Jon Kabat-Zinn (2003) has used AbMT called Mindfulness for pain management and addiction management. Enhancing early child development through AbMTs and educational applications of AbMTs are being researched and explored by scientists such as Daniel Siegel (2008) in the form of a Wheel of Awareness. Neurological growth of the brain through AbMT is being studied by Richard Davidson (2012) from Buddhist practice. With regard to research on AbMT, Merikle (1984) observed that: "*Two different current measures of awareness are contrasted. One measure is objective and equates awareness with the ability to make forced-choice decisions above a chance level of performance. The second measure, is subjective and simply equates awareness with self-reports indicating that an observer 'consciously sees' a stimulus. It is concluded that a better objective measure of awareness is needed.*" In response to such a conclusion, the development of technology has led to an extensive study on the effect of AbMT using new quantitative tools, which provide a more robust indication of the effect of AbMT intervention on the human body and behaviour e.g. the Cortisol test and psychology based questionnaire. Further, use of self-reporting tools coupled with observations has increased in research for fields such as social science and psychology. While both provide ways to authenticate the effect of AbMT intervention, they serve different purposes. Thus, most researchers who have studied AbMT, have used the intervention either to reduce psycho-physiological stress and objectively measure it quantitatively or to create change in the inner value system and subjectively measure it qualitatively. Thus, looking at these two aspects of AbMT research in detail becomes critical.

2.4.1 Research with Stress as an Indicator of change in awareness

Studying stress is important because stress can change cognitive function thereby affecting reasoning, attention, retention (memory) and language and stress is a key ingredient during teamwork (Kofman *et al.,* 2006). Stress can affect behaviour thereby changing social interactions because stimulation of mental activities such as learning, exploring, discovering etc., also called cognitive arousal, are affected (Rauch et. al., 2011). It is important to note that these cognitive arousals in a person are also dependent on many other factors including; personality, time of day and the use of stimulants. Thus, the effect of stress on a person is completely subjective and as felt by somebody is a combination of the nature of the stress factor, ability of the person to react to the stress and stimulating factors such as; sleeping patterns, smoking, coffee drinking, taking anti-depressants, breathing patterns, blood pressure etc. (Cerutti *et al.,* 2006). Thus, measuring stress through standardised quantitative questionnaires cannot be sufficient to investigate the multi-faceted state of the many inter-linked causes of stress, and the interlinked subjective feelings by the individual (Cerutti *et al.,* 2006). Similarly, stress cannot be measured using a qualitative data collection process, such as interviews or descriptive questionnaires. However, physiological factors as indicators of stress are reliable because studies show that the subjective and objective perception of stress may vary, but the physiological response to a stressful situation remains relatively constant between individuals (Sgoifo *et al.,* 2005), which means that individuals who are very sensitive to stress will remain so in any stressful situation. Therefore, using physiological indicators of stress is considered beneficial and an objective measure during this research, but before moving to objective measurement, it is important to understand what is; physiological stress.

From health and a physiological point of view, the term ‘stress’ was borrowed from physics and introduced to signify the feeling of illness by Selye (1956). His work is marked seminal in the field of stress study, specifically the effect of stress on performance, health and behaviour. He convincingly proved that the presence of certain hormones such as Cortisol is due to physiological stress. Thus, the presence of such hormones became accepted as the indicator of physiological stress. The view proposed by Selye was that, “*Stress is a non-specific strain on the body caused by irregularities in normal body function”* (p.58). However, this physical view of stress was considered limited and investigations in stress studies can be said to have taken three major routes: investigating stress causing agents,

identifying stress indicating agents and researching and building stress relieving agents. Most studies combine the three elements and focus on particular stressors, and devise specialised interventions to build a coping mechanism which is demonstrated by specific stress indicators. Thus, it is important to identify stress causing agents, stress relieving agents and stress indicating agents during this research.

2.4.1.1 Stress causing agent:

Researchers have been trying to improve performance by identifying and controlling the stress causing agents. For example, the manipulation of one's surroundings to be soothing and calming is used in Architecture and Design practices; or updating processes and procedures to become efficient and create sustainability, is used for responsible Business and Governance practices. All of these affect physiology in demonstrable and measurable ways. Thus, there are a number of stress-causing agents: chemical, environmental, social, physical etc. But this research focuses on teamwork during DfSI and therefore, the psychological stress which present physiologically, referred to as psycho-physiological stress, is the most relevant to this research.

Mason (1975) conducted successful experiments to prove that psycho-physiological factors are stress causing agents in day-to-day life (the mind affecting the body). Using this knowledge, Ursin (2012) compared the pre-jump stress level of first time parachute jumpers with those of pro-jumpers, and noted that pro-jumpers were less stressed before the jump because they had developed physical and psychological stress coping mechanisms. He used the fact that psycho-physiological factors cause stress, to demonstrate that developing professional practice by building stress-coping mechanisms is an important part of becoming an expert, similar to physical exercise improving the physiological and mental capacity to withstand physical stress. Therefore, this research is interested in showing that teamwork during a DfSI project can be a psycho-physiological stress causing agent, which proves the need for an intervention that facilitates professional development.

2.4.1.2 Stress relieving agents:

AbMTs have been consistently proven to create positive physiological change when studied from a wellbeing perspective by disciplines such as psychology (Daniel Siegel, 2007; 2008; 2012; 2015), sport science (Rauch et. al., 2006; 2011; 2014) and health science (Davidson, 1977; 2003; 2012 and Kabat-Zinn, 2003; 2013). A common novice level AbMT is the 3

minute breathing space. It has been proven to reduce psycho-physiological stress after regular, sincere and daily practice for six weeks (Siegel, 2015; Davidson, 2012; Kabat-Zinn, 2003; 2013). Regular meditative practice of this technique has also shown reduced stress levels and increased ability to deal with stress. The intervention has also been shown to create improvement in cognitive ability, emotional reasoning skills and increased executive functioning including faster reaction times and a greater level of correct responses to cognitive tasks (Hansen, Johnsen, & Thayer, 2003). Thus, the three-minute breathing space was selected as a stress relieving agent during this research. During this research, a team of experts from different religious practices and medical professionals worked during a two-day workshop to create a version of the three-minute breathing space, which was religiously neutral (explained in section 3.6.2).

2.4.1.3 Stress indicating agent:

The logic behind selecting stress indicating agents is deductive. For example, as previously stated; Selye (1956) proved that hormones such as cortisol are stress indicating agents. Cerutti et. al. (2006) used such indicators to identify that stress is also demonstrated through indicators such as anxiety, depression, exhaustion and psychological distress. As before, regular and intentional practice of AbMT has been successfully studied to consistently reduce psycho-physiological stress and build an ability to deal with such stress (Nesvold et. al., 2012). Therefore, measuring physiological stress can be considered a robust indicator for regular meditative practice, if physiological stress is reduced and stress coping mechanisms are built and other variables affecting physiology are controlled by fashioning appropriate criteria for experiment based methods for quantitative research (Rauch et. al., 2011). During this research, a robust method of measuring physiological stress will confirm effective practice of AbMT meditation.

With growth in science, new indicators of physiological stress are being recognised and new ways of measuring stress are being created rapidly, e.g. Heart Rate Variability (HRV), Functional Magnetic Resonance Imaging (fMRI) scan are some of the new techniques. Technical developments mean that the devices used to measure stress with these techniques are now becoming portable, wireless, non-intrusive and more accurate. One such reliable technique of measuring physiological stress is Heart Rate Variability (HRV). HRV measuring devices are reliable and cost effective and the device and training for using it was readily available during this research. Therefore, HRV was selected as stress indicator for this

research. To understand why HRV is an effective technique, a basic understanding of human anatomy is required. This is explained in the section below.

2.4.1.4 A brief understanding of Autonomic Nervous System

In humans, the Autonomic Nervous System (ANS) regulates the functions of different body parts through electrical signaling in response to different stimuli. The ANS is made-up of the sympathetic (SNS) and parasympathetic (PNS) nervous systems. The SNS dominates during stress time resulting in a "fight or flight" response by the body. This is characterized by increased breathing and heart rates and blood flow to the extremities of the body. PNS then causes the opposite effects i.e. "rest and digestion" functions (Karim *et al.*, 2011). ANS controls responses by regulating cardiovascular function, stimulating the sino-atrial node or SA node on the Heart wall (shown in the diagram below), which then regulates other biological systems such as blood pressure, breathing rate, digestion etc.

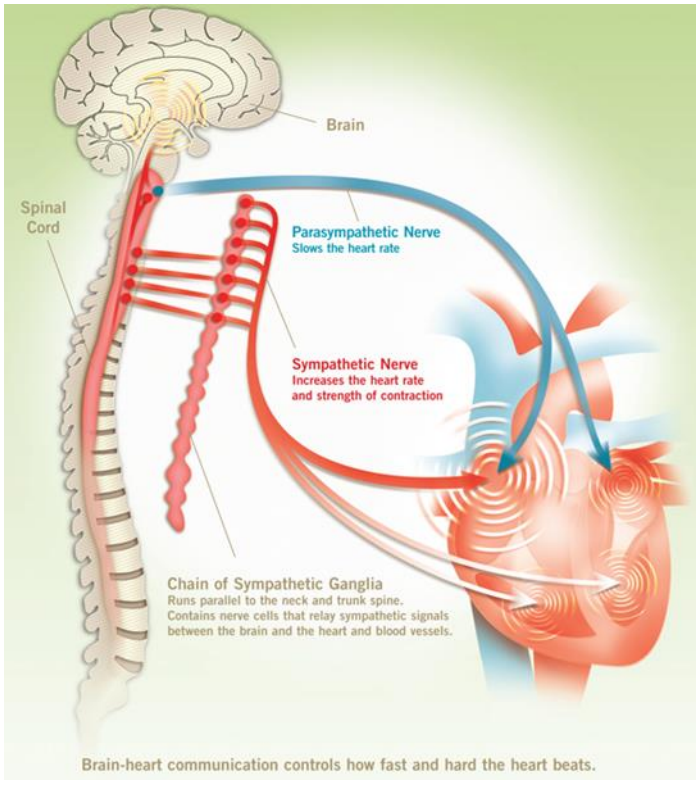


Figure 2.6: The ANS regulating cardiovascular system (Adaptation from Fox, 2006)

The phenomenon, which is the focus of this research, is the oscillation in the interval between consecutive heart beats as well as the oscillations between consecutive instantaneous heart

rates. Heart rate variability (HRV) is the measure of the variation in the beat-to-beat time interval, which occurs due to the stimulation of the SA node by neural inputs from ANS. Generally, the parasympathetic division has the predominant effect on HRV by either increased parasympathetic input or parasympathetic withdrawal (Fox, 2006). Thus, by measuring HRV (RR interval) the current effect of PNS can be understood. Respiration gives rise to waves in the heart rate mediated primarily via the parasympathetic nervous system, and it is thought that the lag in the baroreceptor feedback loop may give rise to 10 second waves in the heart rate, but this remains controversial. Factors other than breathing rate which affect and get affected by the neural input from PNS are the baroreflex, thermoregulation, hormones, sleep-wake cycle, meals, physical activity, and stress.

Heart Rate (HR) has a degree of variability (small fluctuations in HR), due to the interplay between autonomic branches influencing the heart (Akselrod *et al.,* 1981; Karim *et al.,* 2011; Fox, 2006). Oscillations in the neuronal control of Heart Rate are part of a normal healthy cardiovascular system, and help the cardiovascular system respond to any external challenges (e.g. stress) (Fox, 2006). Thus, stimulus, such as stress, can cause cardiovascular changes; in particular these can be seen as changes in the Heart Rate. Figure 2.7 below shows an Electrocardiogram of a single heart beat, which is the visual representation of the electrical signals being sent by ANS to the Heart called the vagal tone.

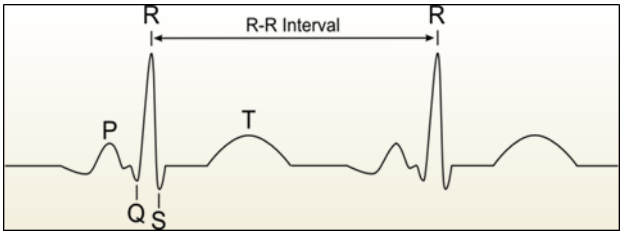


Figure 2.7: Heart Beat
(adapted from Fox, 2006)

Greater Heart Rate Variability (HRV) i.e. greater variability between successive heartbeats is indicative of better heart rate regulation through greater vagal tone. Greater vagal tone is better for coping with stressful situations; hence a greater degree of HRV is important for regulating stress. A decrease in vagal tone indicates a weak parasympathetic control (demonstrated by a reduction in HRV), which is a risk factor for mortality and is reflective of overall reduced autonomic function (Fox, 2006). With a better autonomic function (indicated

by greater HRV) the effects of a stressful situation can be handled more effectively, thus ensuring a relaxed response while under pressure (Paul and Garg, 2012).

In the field of psychophysiology, HRV is related to emotional arousal. High-frequency (HF) activity has been found to decrease under conditions of acute time pressure and emotional strain and elevated state anxiety, presumably related to focused attention and motor inhibition. HRV has been shown to be reduced in individuals reporting a greater frequency and duration of daily worry. Such stress is the cause of many health issues but also impedes daily activities and cognition. This was studied using individuals with post-traumatic stress disorder (PTSD), using the HRV and studies show that HF component of HRV is reduced compared to controls, whilst the low-frequency (LF) component is elevated as shown in the figure 2.8 below. Furthermore, unlike controls, PTSD patients demonstrated no LF or HF reactivity to recalling a traumatic event. Adverse chronic psychological stress induces states of low HRV (Fox, 2006) and decreases the high frequency (HF) component of HRV indicating decreased vagal activity (decreased parasympathetic activation), which indicates poor health.

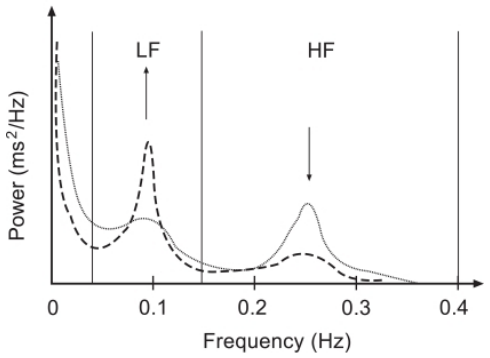


Figure 2.8: Power spectral density, which is frequency domain analysis of HRV (Rauch et. al., 2011)

On the other hand, greater HRV has been associated with increased executive functioning including faster reaction times and more correct responses to cognitive tasks (Paul and Garg, 2012). The finding that increased HRV may be associated with improved cognitive performance, illustrates the importance of techniques that could counter the vagal lowering effects of chronic stress. Recently, numerous publications of biofeedback and neuro-feedback training have demonstrated efficacy in the management of a wide range of medical and

psychological disorders (Fox, 2006). Improved cognitive performance has been seen as a result of the slowed respiratory rate and resultant increased HRV (Rauch et. al., 2011).

Heart rate can be measured using pulse monitors or using ECG monitors and devices for measuring both are non-intrusive. However, a quantitative measure such as HRV will not provide the reason behind the stress or reduction in stress. A greater level of detail behind the experience requires other measures. Also, HRV measurement is affected due to physical exercise, psychological stress, smoking, age, health conditions, diet and the intake of stimulants such as coffee, beta blockers etc. which demands further enquiry during research (Bruning and Frew, 1987). Therefore, HRV measurement has been coupled with interviews and/or questionnaires using specific protocols, which have been developed rigorously (Rauch et. al., 2014). Such rigour is discussed in the next chapter (Section 3.6.5).

2.4.2 Research with Inner values as an indicator of change in awareness

If the solution to the need for professional development is to be advanced through the philosophical view of developing the 'self' using AbMT practice (Varela,1993), then the criteria for such change also needs to arise from the same philosophical space. The improvement of 'self' through the act of becoming aware is equated to the inner value system and associated behaviour (Schön, 1983; Argyris and Schön, 1987). As the value of any object defines its importance and its status, similarly, it can be argued that the human inner values are the lynch pin in the territory of human behaviour (Peterson and Seligman, 2004) and the field of decision making (Schwartz, 2006) bringing 'value' to the person and society. Though such value is important, the understanding of value during this research stems from the development of professional practice through reflection and contemplation with the use of AbMT practice. Thus, the hypothesis during this research is that, the act of becoming aware through AbMT practice will lead to improved interaction in teamwork during DfSI projects, demonstrating the change to the inner value system of the participants and their teams. Then the obvious question arises, what would such an inner value system look like?

From the perspective of positive psychology, the understanding of the inner value systems should focus on strengths rather than weaknesses and the interest should be in building the inner values as in repairing any deficiencies (Peterson and Seligman, 2004). This does not mean that the reality of problems pertaining to inner values are being ignored or belittled, but the suggestion from Peterson and Seligman (2004) is being followed, who say that, "*Those*

promoting human potential need to pose different questions from their predecessors who had assumed a disease model of human nature... Character strengths are the bedrock of the human condition and that strength is a congruent quality and represents an important route to psychological good life." Such inner value systems then need an evaluation technique. While social science and psychology have numerous techniques such as observation, self-reporting etc., there is criticism that such techniques lack detailed empirical evidence, which is replicable. Bourdieu (1975), Thiollent (1980) and Löwy (1985) highlighted such a lack of empiricism in social research and their criticism of the culture of observations and self-reporting techniques led to the need to produce objective proof and replicable results in social science research. Mills (1980) refers this shift in culture as "*methodological inhibition*", criticizing the exacerbation of the quantitative approaches. He recognizes the need for social research to be able to provide more empirical evidence along with the observational and self-reported details. Thus, there is clearly a need for a new way to objectively evaluate what people subjectively feel and experience.

Conceptual classification and associated approaches to evaluation provide a universal terminology for researchers and clinicians, allowing exchange of collective meaning within and across professional fields of knowledge as well as with the general public (Peterson and Seligman, 2004). Views on development and growth are rapidly changing to such universal classifications. For example, the term *health* used to be defined as a lack of illness, but the rising concern of wellbeing does not focus on wellness alone and classifies growth of physical, mental and character-based abilities (Siegel, 2007; 2008). Similarly, in education, imparting and acquiring knowledge depended solely on the grade a student attains in the subject he/she studies, which is now changing and has evolved from learning in batches, to personalised learning for every student where the curriculum focuses on enhancing core abilities and building moral values. Thus, the effort to understand people and the decisions they make, with the help of conceptual classification, needs to focus on both strengths and weaknesses as authentic and as amenable to scientific understanding of inner values (Peterson and Seligman, 2004).

To create a conceptual classification of inner values that are important for teamwork during DfSI projects, the focus needs to be on the strengths of character that can be shown to lead to effective social change through design-led teamwork. The inner values to be selected need to recur in literature on both teamwork and DfSI. Similarly, evaluation should also focus on

inner values that are believed to change due to regular and intentional AbMT practice. Thus, those inner values that lie in this focused context will become the starting point for conceptual classification (see figure 2.9).

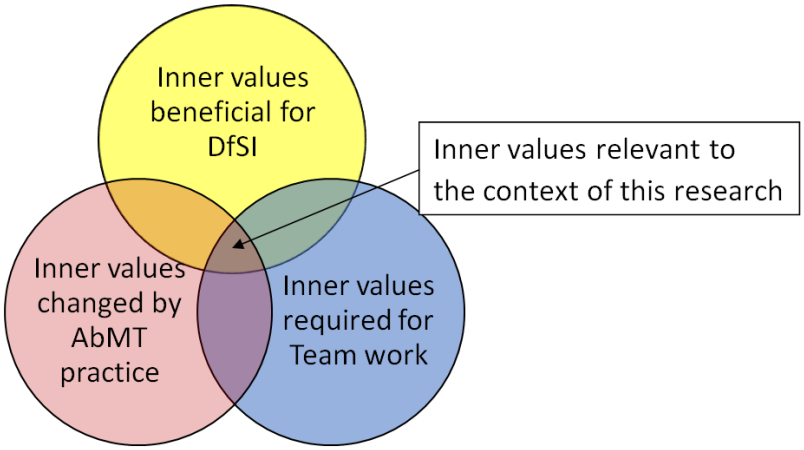


Figure 2.9: Selecting inner values for conceptual classification

Selecting relevant inner values requires defining them in such a way that they can provide guidance in understanding teamwork during DfSI projects. Such guidance has been borrowed from Peterson and Seligman's (2004) book: Character Strengths and inner values: A handbook and classification. This guidance has been selected because it utilises key literature such as the Diagnostic and Statistical Manual (DSM) (American Psychiatric Association in Peterson and Seligman, 2004) and International Statistical Classification of diseases and related health problems (ICD) (World Health Organization in Peterson and Seligman, 2004). The definition helps in assessing the inner value system from the way participants articulate their experiences through language. Before identifying inner values, the term inner values must be defined thoroughly. Without proper definition, subjective interpretation can affect observations and conclusions (Mills, 1980).

2.5 Defining Inner Values

The most famous research on objectively defining inner values is by Schwartz (2006, p. 3) who mentions,

> "*Despite or, perhaps, because of the widespread use of values, many different conceptions of this construct have emerged (e.g., Boudon, 2001; Inglehart, 1997; Kohn, 1969; Parsons, 1951; Rokeach, 1973). The application of the values construct in the social sciences has suffered, however, from the absence of an agreed-upon conception of basic values, of the content and structure of relations among these values, and of reliable empirical methods to measure them (Hitlin and Piliavin, 2004; Rohan, 2000)*".

An inner value, according to Schwartz (2006), is the intrinsic worth that a person assigns to thoughts or ideas and creates outcome because, "*when values are activated, they become infused with feelings."* He explains this with an example that, "*people for whom independence is an important value become aroused if their independence is threatened, despair when they are helpless to protect it, and are happy when they can enjoy it."* Thus, according to Schwartz, inner values are "*beliefs linked inextricably to affect*". Because of this reason, inner values motivate actions because they determine the individual's desirable goals. He explains that, "*People for whom social order, justice, and helpfulness are important values are motivated to pursue these goals."* However, the inner values are not bound to certain feelings and a few actions alone and as Schwartz explains, they; "*transcend specific actions and situations".* He explains how inner values are in-grained in our behaviour by providing the example, "*Obedience and honesty, for example, are values that may be relevant at work or in school, in sports, business, and politics, with family, friends, or strangers. This feature distinguishes values from narrower concepts like norms and attitudes that usually refer to specific actions, objects, or situations."* Thus, the inner values are not present because of emotions or situations, but are inside a person for different situations. The inner value will demonstrate itself in any and even all types of contexts. Schwartz brings forth a very important point that inner values provide "*standards or criteria."* He explains that the inner values of a person are the moral guide, the ethical scale and the quality indicator for one's own and other's actions and thoughts. He writes, *"People decide what is good or bad, justified or illegitimate, worth doing or avoiding, based on the possible consequences for their cherished values. But the impact of values in everyday decisions is rarely conscious. Values enter awareness when the actions or judgments one is considering have*

conflicting implications for the different values one cherishes." This unconscious nature of inner values affecting a person's decision-making process determines not just the behaviour but the very dispositional existence. Inner values, thus, decide the importance and make up hierarchy of things in a person's mind. Schwartz explains that as inner values determine the importance of things, they themselves have their importance in a person's mind as compared to other inner values. He elaborates, "*People's values form an ordered system of value priorities that characterize them as individuals.*" Thus, inner values help in building the identity of the person by defining the belief system. Schwartz explains that any action is not motivated by one or two inner values and is a combination of a complex inner value system influenced by multiple inner values at the same time. He explains that "*The trade-offs among relevant, competing values is what guides attitudes and behaviors*" (Schwartz, 2006). However, it is important to realize that inner values are highly context specific and may be present in a person but not demonstrate themselves based on their relevance to the actor in the context. Thus, the inner values provide a window to determine the motivations, intentions and engagement of actors during different contexts and their meaning and definition is very context specific.

2.5.1 The inner values for teamwork during DfSI that change due to AbMT

As explained earlier, value theory by Schwartz (2006) defines 'values' as beliefs and motivational constructs that transcend specific actions and situations. Thus, a change in the inner value system changes perceptions as well as the nature of actions, what Argyris and Schön (1987) call double-loop learning. Though improved interaction does not always mean better creative outcomes, it has been affiliated with a better process of working and developed working relationships (Simon, 1947) which in-turn aid the success of DfSI projects (Hatchuel, 2001). Because there is no established set of inner values recognised universally for teamwork during DfSI projects, a review of literature is required in fields such as; participation for social innovation (Cooke and Kothari, 2001; Biestek, 1953; Swami, 2000), psychology (Peterson and Seligman, 2004, Kabat-Zinn, 2003), Design (Osborn, 1963; Nemeth, 2012; IDEO, 2010; Kwon, 2013; Uzzi, 2007), evolutionary biology (Nowak and Highfield, 2011; Varela, 1993; Hayes, 1999) and many other overlapping fields of knowledge that resonate with the context of this research. Similarly, the effects of AbMT on inner values have been studied from disciplines such as; psychology and psychiatry (Kabat-Zinn, 2013), leadership theory (Scharmer, 2010; Luthans et. al., 2001 ; Koya, Sice and Mansi, 2014) and eastern studies (Suzuki, 2000; Hunter and Rigby, 2009). These literature also fall within the context of this research (figure 2.9) using which appropriate inner values can be selected.

Sanders and Simons (2009) explain the types of values created during DfSI. They present an example of the 'Aid to Artisans' initiative where designers work with local artisans and end-users in society and government. Value in this context is created through the benefits generated, which in their example is the expected government aid provided at the beginning of DfSI project and the income generated when finished goods are sold at the end of DfSI project. According to them:

- Value is also created by forging relationships throughout the DfSI project, and these relationships between different stakeholders can survive beyond the project length creating a long lasting impact through legacy.
- Similarly, there is a value generated through creative interactions, which leads to an increase in the knowledge about user needs, the design creation process, etc.

Tynan et. al. (2010) explains such values as, 'value of a symbolic nature'. In the above example, value of a symbolic nature is the sense of belonging that is created. What Tynan et. al. (2010) touches on is the intangible or intrinsic value generated by design during DfSI projects. Cross (1982, p.115) also points to the importance of the reorientation of design education towards such intrinsic value and mentions the need for educators and researchers to divert efforts in this direction. Such change not only improves society that design is working for, it develops the professional practice of the individual designer and the design team as a whole. From the perspective of building an aware practice of teamwork during DfSI projects, the success lies on the founding factors in human behaviour, which, for this research, are the inner values that can be harnessed through the practice of AbMT. Therefore, the literature review is used to determine the inner values most relevant to the context of this research.

2.5.1.1 Inner Values that create relationships

Co-operation is a crucial building block for creating relationships for teamwork during DfSI that can benefit society during and beyond the DfSI project. With cooperation, relationships are initiated, the knowledge is shared and collaborative actions can be taken. Therefore, the inner values associated with co-operation will be helpful for teamwork during DfSI projects. Co-operation, as understood in evolutionary theory, is direct reciprocity (Nowak, 2011). In the theory for direct reciprocity, when any two individuals co-operate they do so for a perceived benefit 'b' acquired by paying a perceived cost 'c'. They will co-operate if they perceive benefit is greater than cost (b>c). Such perceptions of benefit and cost are motivated by the inner value system of the individual. Game theorists have always stated that the

choices are based on certain intrinsic aspects or inner values, such as kinship, trust, jealousy etc., which define the view of benefit and the cost (Nowak, 2011). However, to begin any relationship, what is required is **hopefulness for co-operation**, which is "*the intention that the first move of both the parties will be towards co-operation*" (Nowak, 2011, pg. 272). Nowak (2011) explains that, in the real world, interactions happen iteratively between people, and the inner values for the next interaction are determined by the perception of interactions in past. Therefore, hope for co-operating with a person will increase or decrease with perception of past experiences but initial choice is dependent on perception of one's own and other's motives.

Peterson and Seligman (2004) from psychology mention that hopefulness for co-operation is a strength of character, which helps in initiating new interactions and building new relationships. It is a positive psychological concept of wishful thinking, consisting of the dimensions of both willpower (agency) and way-power (pathways) found to be related to cognitive, athletic, health improvements (Peterson and Luthans, 2003) and positive behaviour (Dunlap et. al., 2008). Leadership studies (Luthans et. al., 2001; Koya, 2013) explain how hopeful leaders are able to make holistic decisions because they are inclusive and encouraging in their approach with others. From a design point of view, DfSI requires hopefulness not only from a designer or design team but also from stakeholders and the community of users. Such hopefulness is required for inspiring possibility through participation (Larsen et. al., 2013). Practice of AbMT is shown to change people's views to a more hopeful way of decision making because it alleviates self-created psychological suffering (Kabat-Zinn, 2013). The Diagnostic and Statistical manual is considered the authoritative literature in psychology (Snyder, 2000; Peterson and Seligman, 2004). It recognises keywords that indicate the inner value of hopefulness for co-operation as; 'collaborate', 'co-operate', 'equal opportunity', 'inclusion' etc. The presence of these keywords and any other phrases that indicates the participant's intention to co-operate with the team, stakeholders and users are used as an indicator for the presence of the inner value of hopefulness. On the other hand, keywords such as 'indifference', 'ignoring', 'non-inclusion' etc. can be associated with a lack of the inner value.

Nowak explains that ideally, when two parties are profiting from an interaction during a relationship, then the interaction should occur. However, this is not the case because people either do not want to accept the smaller share of benefits generated or accept a bigger portion

of cost incurred during the act of co-operation. Therefore, Nowak argues that the inner value of generosity of spirit is required to accept either smaller benefits or a bigger cost to initiate and continue relationships. **Generosity of spirit** can be defined as "*the ability to accept a smaller share of the benefits from co-operation*" (Nowak, 2011, p. 208). Putting the competition aside is important for collaboration and Peterson and Seligman (2004) explain that the inner value of generosity of spirit determines humanity (p.50) and relies on doing more than what is only fair (p.37). Showing generosity even when an equitable exchange would suffice shows, "*kindness, even if it cannot be returned and understanding, even when punishment is due*" (p.326). Thus, generosity of spirit is an important inner value for creating co-operative relationships that could benefit teamwork during DfSI projects. From a design point of view, Amabile, Fisher and Pillemer (2014) explain; IDEO utilises generosity as the norm to create the culture of helping through collaboration, which is the secret for success during their DfSI projects. Their survey published in Harvard Business Review shows that such generosity is needed for participation and engagement. Generosity of spirit has also been considered the principle and outcome of AbMT practice (Davidson and Goleman, 1977; Siegel, 2015; Davidson and Kabat-Zinn, 2003; Kabat-Zinn, 2013). Generosity of spirit is associated with attitude of 'compromise for greater good'. (Peterson and Seligman, 2004). The lack of generosity of spirit is associated with phrases that include the keywords; 'set in ways', 'unwillingness', 'withdrawal' etc.

Nowak (2011) argues that tit-for-tat logic can end the cycle of co-operative interactions and can put an end to co-operative relationships. What is needed is **forgiveness for defection**[8], which is, "*the ability to reciprocate defection with co-operation during the next interaction, with a certain probability*" (Nowak, 2011, pg. 223). Nowak explains that in a relationship, the opportunity for co-operation does not occur once, and decisions are affected by past experiences. The consequence of defecting from cooperation in a tit-for-tat strategy is too harsh and the consequence of defection in altruism or selflessness is too low, even non-existent. If the past interactions are viewed to be negative, then the perceived value for future interactions should diminish with some consequence that is a balanced response. Thus, the inner value of forgiveness should lead to stronger co-operation with experiences that are perceived positive and should weaken if the experiences are perceived to be negative. Such a view of forgiveness has been recognised in many religious teachings, eastern and western,

[8] Defection is an act of non-co-operation by the opposite person

ancient and modern, but is not strictly a religious inner value (Peterson and Seligman, 2004, p. 447). Peterson and Seligman (2004, p. 449) mention the Hindu philosophy of repentance with regard to forgiveness and highlight that both are important precursors to the complete restoration of a relationship. Thus, the improved intentions of the subordinating co-operator should be included in the factor while determining the inner value of forgiveness. Thus, the inner value of forgiveness is important and brings value to teamwork during DfSI projects because it helps in sustaining co-operative relationships. From a DfSI point of view, Kwon (2013) explains that designers have to let go their self-image as a victim and honour the process of healing. He provides a journey (figure 2.10) that designers are being taught, where forgiveness is equated to having an open heart. Such understanding is also seen in Scharmer's (2000) leadership theory.

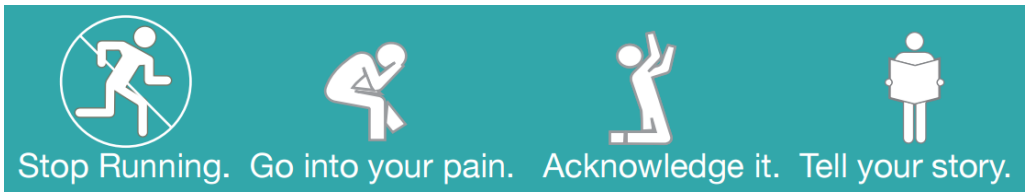


Figure 2.10: Forgiveness as open heart is fundamental of DfSI
(Kwon, 2013)

Ability to forgive is at the heart of AbMT practice. Kabat-Zinn (2013) explains the need for forgiving one's self and letting go one's own suffering through the practice of AbMT. Davidson and Goleman (1977) compare meditation to a state of self-hypnosis and the need for forgiving others during meditation for achieving true inner peace. Forgiveness can be associated with the keywords; 'open heart', 'letting go' and phrases such as, 'it happens', 'no one's fault' etc. Further, the inner value of forgiveness can be said to exist when a person shows an intention not to assign blame for a past event (Peterson and Seligman, 2004). Conversely, the lack of the inner value of forgiveness can be identified when a person's language reveals the intention of assigning blame.

Uzzi (2007; 2008) conducted experimentation to comprehend the effect of relationships between team members on their creative outcomes. By mapping the relationship between people, Uzzi quantified the association between two individuals in a value he called Q and studied musical teams. When the Q was low, less than 1.7 on Uzzi's five-point scale, it denoted a poor relationship between team members, and the musical recitals were likely to fail. The weak relationship meant a lower level of understanding about each other's thought

process and actions, which created hesitation and a hurdle for the artists to share ideas. On the other hand, if Q was too high, above 3.2 on Uzzi's scale, then the strong relationship led to similarity in thoughts and a lack of novelty, which hampered the creativity and innovation by such teams. Uzzi's research highlights the idea of keeping a **beginner's mind** so that team members keep an open mind and learn something new from each other, yet do not remain unknown to one another. Such a view resonates in Scharmer's work (2010) on leadership where he explains the concept of open mind is important for leaders to create healthy relationships. The burden of knowledge, as explained by Scharmer (2000, pg. 4), embeds itself as tensions or stress in the body and brain and he recommends the practice of AbMT. From an enactive cognitive science perspective, Varela (1993) explains the biological learning process (p. 52-54) stems from the need for survival which creates 'Fear' based synaptic connections in the brain which are necessary for survival. But such knowledge can also become a hinderance to acquiring new knowledge. Thus, 'Unlearning' to gain a beginner's mind becomes crucial for survival itself (Scharmer, 2010). For unlearning, a person has to relax the body and mind, which can be done with the practice of a suitable AbMT. Beginner's mind is also referred to as, letting go preconceptions. In DfSI, IDEO (2010) encourages a human centred approach urging designers to, "*Approach problems as a novice even if you already know a lot about them... Let yourself learn… Be willing to experiment.*"

Early attempts to define a beginner's mind include James (1902, p.34), who speaks of, "*that which is seen as most primal and enveloping and deeply true.*" Such understanding of a beginner's mind came from Zen meditation as having an undisturbed, open experience of things as they are and freedom from preconceptions when approaching anything (Suzuki, 2010). In psychology, Buddhist meditation techniques have been studied and findings mention that beginner's mind is to have a clean slate, experiencing everything as if for the first time (Greenberg, 2012; Kabat-Zinn, 2013). Using this as the understanding of a Beginner's mind, the inner value of Beginner's mind is associated with a person showing the intention of relinquishing control over a thought or idea e.g., I thought that way but I changed the view (as a positive remark). The lack of the inner value of a beginner's mind is associated with a person not relinquishing control over a thought or an idea, e.g. that's what people are used to, that's how they (stakeholder/team member/client) are, etc.

2.5.1.2 Inner Values through creative interactions:

With regard to the value created through interactions Osborn (1963) propagated brainstorming. In his view, the most important thing that distinguishes brainstorming from other types of group activities was the absence of criticism and negative feedback. Brainstorming meant holding a meeting with no-judgments towards the opinions of others. Osborn (2008, p. 32) explained the reason for this as:

> *"Creativity is so delicate a flower that praise tends to make it bloom while discouragement often nips it in the bud. Forget quality; aim now to get a quantity of answers. When you are through, your sheet of paper may be so full of ridiculous nonsense that you'll be disgusted. Never mind. You're loosening up your unfettered imagination making your mind deliver."*

Nemeth (2012) conducted research and proved that Osborn's approach may be counterproductive and even ineffective. Nemeth explains that:

> *"While the instruction 'Do not criticize' is often cited as the important instruction in brainstorming, this appears to be a counterproductive strategy. Our findings show that debate and criticism do not inhibit ideas but, rather, stimulate them relative to every other condition"* (p. 363).

While, Osborn's concern was the inhibition of creativity and imagination with the mere hint of criticism, Nemeth (2012, pg. 369) bestowed the importance of dissent for stimulating new ideas by encouraging engagement with the work of others and reassessing one's own viewpoints which can cultivate creativity with new frames of reference. Both Osborn and Nemeth put forth very important points. The desire for harmony during decision-making should not override a realistic appraisal of alternatives. Group members should try to minimize conflict and reach a consensual decision but this should not be at the expense of the critical evaluation of alternative and opposing ideas or viewpoints. Dorst (2011) explains such conflicting view-points as paradox, which make a problem wicked and design-led innovation uses these paradoxes as an opportunity rather than considering them as a hindrance. Then, with respect to design-led innovation, "*...the initial assumption (within moral philosophy) that a conflict is irresolvable, is misguided, because it defeats any attempt to do what designers often do so well, namely, to satisfy potentially conflicting considerations simultaneously*" (Whitbeck, 1998, p. 56). However, Osborn does not criticise having debates over creative differences, but can be said to urge for the inner value of being non-judgemental

and patience so that every opinion can be presented. Nemeth can also be said to urge the inner value of patience for collegial debate, but also the inner value of acceptance of other's views for exchange of critical evaluations with others involved in the project. These inner values are discussed below.

The inner value of **patience** is, "*not interrupting or reacting before letting the occurring event unfolds completely*" (Grossman, 2011). The inner value of patience is described as a conscious effort through an event and not as a state of mind. While patience has been understood as a Gandhian view of preserving balance in the face of provocation, delay, annoyance and other negative instigations (Hunter and Rigby, 2009), ancient wisdom explains that patience is not simply waiting (in Sanskrit: pratiksha) or endurance (in Sanskrit: sahansheelta). It is not inactivity. Patience is a conscious choice of actively seeking balance in one's own choices, thoughts and actions (Swami, 2000). AbMT creates an ability to remain patient and continue efforts of self-improvement and development (Davidson and Goleman, 1977; Kabat-Zinn, 2013). AbMT practice promotes the view of patience instead of instant results that translate into a patient and disciplined way of life (Siegel, 2015). Therefore, the keywords associated with the inner value of patience show the intention and ability not to interrupt or react during an event and demonstrate effort to keep working without getting provoked, desperate or overcome by negative reactions. Similarly, patience is also not getting too excited, eager or overly optimistic.

Acceptance as an inner value is important to overcome turbulence in the mind and the suffering that follows due to an unexpected event. As an example, Jon Kabat-Zinn (2003) explains that when a person is sick, the physical illness and pain cloud the mind and bring suffering to the person. The suffering is not due to the pain but due to the lack of acceptance of the diagnosis and the consequent illness and pain. However, the term unexpected does not necessarily apply to negative events alone, it also entails the positive events that distract the thought process (Peterson and Seligman, 2004, p. 87). Thus, acceptance is important for a steady thought process irrespective of the events faced by a person. It also means adapting to the changed circumstances and going with the flow as opposed to rolling with the flow. **Acceptance** has been defined as "*experiencing events fully and without defence, as they are*" (Hayes, 1999, p. 30). It is usually observed after an event has occurred. Similar to Patience, Acceptance is often misunderstood as a passive act of giving in (Hayes et. al., 1999). Acceptance is the active and vigilant effort to build and maintain focus (long-term or short-

term) when there is a change in circumstances or even the changes to the goal itself. Fully accepting an event may not always be possible but it is crucial to learn from an event, which is possible only when it is accepted as it is. In DfSI, the motivation is to not accept events but to change them. However, change can only begin when the boundaries and deficiencies are accepted, otherwise the situation is bound to repeat itself (Peterson and Seligman, 2004). Thus, there is need for wisdom to recognise what to accept and when to strive for change (Dorst, 2011). Therefore, acceptance at the right time and about the correct things is required (Peterson and Seligman, 2004, p. 192). Almost every AbMT has its roots in acceptance of a situation. It is the first step towards letting go the suffering and becoming a hopeful person (Kabat-Zinn, 2013). Thus, by practicing AbMT, one practices acceptance, which is embodied and regularly demonstrated in behaviour and actions. On the other hand, a lack of the inner value of acceptance of an event is associated with defensive reaction in response to an event. Wishing and hoping things were different or happened differently can be associated with a lack of the inner value of Acceptance.

In design contexts, being non-judgemental is considered important by Osborn. Non-judgemental attitude is required to genuinely understand our own experience along with all associated emotions and feelings. It is an attempt not to let personal bias come in the way of our own objectivity or another person's input. However, being non-judgemental should not be equated to not being critical. As Nemeth points out, while critical review of ideas is necessary, being judgmental towards others shows that a final permanent opinion has already been made, which can hinder discussions. This means, judgment towards others creates a distorted account of events. Putting social development into perspective, Biestek (1953) mentions being non-judgemental does not mean being devoid of feelings and emotions and definitely does not mean being indifferent to ethics, morals and values. It is actually, the exact opposite. Being non-judgemental is avoiding personal bias so that a genuine account of reality can be understood. Though pure objective reporting is not the goal, being non-judgemental provides an unbiased report of events that includes emotions and feelings as a part of it. The ability to be non-judgemental is thus multi-dimensional, which is created by AbMT practice (Williams and Kabat-Zinn, 2011). Identifying the inner value of being non-judgemental has been associated with factual reporting without personal bias. Non-judgmental behaviour can be observed when participants describe facts, and are not thinking about 'good' or 'bad', 'fair' or 'unfair' (Dreyfus, 2011). When there is a lack of the inner value of a Non-judgemental attitude, a person would show the intention of categorizing a

person or group of people. For example, everyone is a certain way. Thus, generalizations are the clue to recognising a Judgemental attitude.

2.5.1.3 Critique of selected list of Inner Values

The list of inner values discussed above is not exhaustive, it is a list required to begin an enquiry into the role of inner values that could aid teamwork during DfSI projects. Nowak appreciates there are more inner values that play a role in creating and maintaining relationships. Peterson and Seligman also make note of other inner values associated with character. They explain that the classification of inner value requires understanding of causality where every inner value can be a cause or a consequence or both. For example, the inner value of 'trust' can be perceived as a cause for being 'hopeful for co-operation' and perceived as a consequence of it. What remains true is that inner values are defined subjectively by the person applying them, which determines their hierarchy and classification. For example, the inner value of trust encapsulates the inner values of; hopefulness, generosity and forgiveness (Peterson and Seligman, 2004). Therefore, including trust as an inner value will overlap with the observation for the inner values it encapsulates and therefore, trust is not included in this study.

On the other hand, inner values such as Humility have been described as a consequential choice and as a causal root for AbMT practice. Such an inner value is recognised to be useful in DfSI and has been named Humble-design (de Jong, Önnevall, Reitsma, and Wessmann, 2016). However, the usefulness of humility in teamwork is less well defined. Recognizing such an inner value is difficult as it is an action, a conscious choice, which depends on other inner values.

Similarly, Kindness has been recognised as an inner value for teamwork, DfSI and AbMT practice. Kindness is also important for classification from psychological point of view. Kindness is perceived as opposite to ruthless honesty, as an act of gentle honesty. However, this weakly defined inner value can make it difficult to identify kind acts in good design practice.

Though the inner values discussed above fit into the criteria set out for the literature review, it is important to verify the face validity of the list of inner values with the opinions of real-world expert design practitioners. It is also important to note that the inner values are never mutually exclusive and that a combination of inner values may affect a person in any given

situation (Argyris and Schön, 1974). The inner values selected for assessing the effect of AbMT on teamwork during DfSI projects are studied through thorough review of literature which fits the context of this research and is summarised below in section 2.5.1.4. The literature discussed above is summarised in the following sub-section and the model derived from the review is illustrated in Table 2.1 (Vyas et. al., 2014).

2.5.1.4 Summary of the inner values

Inner value	*Author*	*Context*	*View*
Hopefulness for co-operation:	Nowak, 2011	Bio-economics	Symbiotic development
	Snyder, 2000; Peterson and Seligman, 2004	Positive psychology	Character Strength for initiating relationship
	Kabat-Zinn, 2013; Dunlap et. al., 2008	AbMT research	alleviates self-created psychological suffering through dimensions of both willpower (agency) and way-power (pathways)
	Luthans et. al., 2001 and Koya, 2014	Leadership	Decision making
	Larsen et. al., 2013; Vikari and Tornaghi, 2010	DfSI	Inspiring possibility through participation
Generosity of Spirit	Nowak, 2011	Bio-economics	Sharing benefits and cost of co-operation
	Peterson and Seligman, 2004	Positive psychology	Doing more than what is fair
	Davidson and Goleman, 1977; Siegel, 2015; Davidson and Kabat-Zinn, 2003; Kabat-Zinn, 2013	AbMT research	principle and outcome of AbMT practice
	Amabile, Fisher and Pillemer, 2014	DfSI	IDEO's Culture of Helping by making collaborative generosity the norm
Forgiveness for defection	Nowak, 2011	Bio-economics	Reciprocating defection with co-operation
	Peterson and Seligman, 2004	Positive Psychology	Restoration of relationship
	Davidson and Goleman, 1977; Kabat-Zinn, 2013	AbMT research	forgiving others and oneself during meditation for achieving true inner peace
	Kwon, 2013	Design	Fundamentals of DfSI

Continued on the next page

Patience to let events unfold	Osborn, 2008	Design	Patience towards unacceptable ideas
	Dorst, 2011; Whitbeck, 1998	Design thinking	design-led innovation uses paradoxes, which make a problem wicked, as an opportunity rather than considering them as a hindrance
	Nemeth, 2008	Design	Patience towards opposing ideas
	Grossman, 2011; Siegel, 2015	Psychology	Not reacting before letting event unfold completely
	Davidson and Goleman, 1977; Kabat-Zinn, 2013	AbMT research	continue efforts of self-improvement and development
	Hunter and Rigby, 2009	Gandhian Philosophy	Preserving balance in adversity
	Swami, 2000	Culture Studies	Not waiting or enduring but actively seeking balance
Acceptance of situation	Nemeth, 2012	Design	Acceptance of debate and criticism
	Osborn, 2008	Design	Acceptance of creative out-of-the-box ideas
	Dorst, 2011	Design	wisdom to recognise what to accept and when to strive for change
	Heyes, 1994	Biology	Experiencing event without defence, as they are
	Kabat Zinn, 2013	Psychiatry	Facing unexpected events
	Peterson and Seligman, 2004	Positive Psychology	Steady thought process irrespective of faced events
Being Non-Judgmental	Osborn, 2008	Design	'Do not criticize' strategy for creative input
	Williams and Kabat Zinn, 2013	Psychiatry	Genuine account of reality
	Biestek, 1953	Social Work	Avoiding personal bias
	Dreyfus, 2011	AbMT research	describe facts, and are not thinking about 'good' or 'bad', 'fair' or 'unfair'
Keeping a Beginner's mind	Uzzi, 2007	Creative studies	Correlation between Strength of Relationships and Creativity
	Varela, 1993	Enactive cognitive science	Unlearning the fear based synaptic connections
	Scharmer, 2000; 2010;	Leadership theory	Burden of knowledge
	Greenberg, 2012; Kabat Zinn, 2013	Psychiatry	Experiencing everything as if for the first time
	Suzuki, 2000	Japanese wisdom	Letting go preconceptions
	IDEO, 2010	Design	Approach problems as a novice even if you already know a lot about them... Let yourself learn

Name of Inner Value	Definition of Inner Value	How to recognize if the 'Inner Value' exists in transcripts?	How to recognize if a 'lack of the Inner Value' exists in transcripts?
Hopefulness for co-operation	Hopefulness for co-operation is the intention that the first moves from both parties will be towards co-operation (Nowak and Highfield, 2011).	The participants say keywords/phrases that would indicate the intention to co-operate with at least one stakeholder, team member or the client as their first move. E.g. collaborate, co-operate, equal opportunity, include (others) in the process (project activity) etc.	The participants say keywords that would indicate a lack of intention to co-create with a stakeholder, a team member or a client e.g. (input from a stakeholder) did not matter to us/me, no need (for input from a stakeholder), they (stakeholder's/team members) ignored input (from other stakeholder/team members) etc.
Generosity	Generosity is the ability to accept a smaller share of benefit that arises from co-operation (Nowak and Highfield, 2011).	The participant's language would indicate an intention to make a compromise for the greater good e.g. I/we decided to get on with it (the task at hand) or accepted it (team decision) so as to save time etc	The participant's language would show an intention of not accepting a lesser share, or not compromising. E.g. I like it (task) this way but they (team/stakeholder) wouldn't' listen so we kept pushing until they did. For similar reasons if a participant chooses to be silent, or withdraw participation then these are also examples of a lack of Generosity of spirit.
Forgiveness	Forgiveness is the ability to reciprocate defection with co-operation in the subsequent interaction (Nowak and Highfield, 2011).	The participant's language would show an intention not to assign blame for an event that occurred during the project. e.g.; "it happens", "no one's fault" etc., to show a forgiving attitude.	The participant's language would show an intention of assigning blame for an event during the project to a person or people. e.g.: Repetition of negative language to describe the same incidence shows a non-forgiving attitude. Reflections by participants on the outcomes of an incident have negative language, e.g.: "it was crap" or if the participant blames someone for an outcome by saying "it was avoidable" also indicates a lack of forgiveness.
Patience	Patience as an inner value is not to interrupt or react before letting an occurring event unfold completely (Grossman, 2011).	The participant's language would show an intention not to interrupt or react before letting the event unfold completely. E.g. We/I kept on trying to understand. We continued to make contact etc.	The participant's language would show an intention of interruption or reacting before letting the event unfold completely. E.g. it (an event) was happening and I couldn't take it anymore, It felt like ages, I couldn't' be bothered after a while, it takes too long etc.
Acceptance	Acceptance is experiencing events fully and without defence, as they are (Hayes, 1994, p. 30).	The participant's language would show an intention of experiencing the event without defence. E.g., it happened but none could have done otherwise etc.	The participant's language would show an intention of experiencing the event with defences. E.g. It (event/action/reaction) shouldn't have happened this way etc. Wishing and hoping things were different or happened differently is an example of lack of Acceptance.
Non-judgmental	Being Non-judgmental is the action of describing the facts objectively, and not thinking about 'good' or 'bad', 'fair' or 'unfair'. Judgments encapsulate feelings about the situation, are irrational and cannot be explained. (Dreyfus, 2011, pg.53).	By definition chosen for this research Non-judgmental behaviour can be observed when participant is describing the facts, and not thinking about 'good' or 'bad', 'fair' or 'unfair'. E.g. participant mentions an incidence with certain difficulties as just fact.	The participant would show the intention of categorizing a person/people in a certain way. E.g. I think, everyone is this (certain) way, they (stakeholder/team member/client) are like that (certain way) etc. Thus, generalizations by participants can be the first clue to recognising Judgemental behaviour.
Beginner's mind	Beginner's mind is relinquishing control over a particular thought or idea or preconception (Deraz, Varela and Vermersch, 2000)	The participant would show the intention of relinquishing control over a thought or idea e.g. I thought that but it wasn't that way (positive remark)	The participant would show the intention of not relinquishing control over a thought or idea e.g. That's what people are used to, that's how they (stakeholder/team member/client) are etc.

2.6 Chapter Summary

Rising need for design in other sectors has brought importance to DfSI. But, dealing with complex social issues requires teamwork from multi-disciplinary experts and brings forth an urgent need for the development of professional practice for teamwork during DfSI projects. Such a need is addressed in design through reflection, through the act of becoming Aware (Schön, 1983; Argyris and Schön, 1974; Anderson, 1994). Enactive cognitive science encourages a different perspective to the act of becoming Aware, by utilising meditative practice for reflection and growth (Varela, 1993; Sice and French, 2004). Therefore, the role of awareness in reflective design practices needs to be more explicit for multidisciplinary design environments and explored further for moving beyond rational theories and dealing with the complexity and ambiguity that social innovation projects face (Young and Spencer, 2009, p.3). The effects of awareness-based meditative techniques have been studied in the past from psycho-physiological and social science points of view, separately. Hence, there is need for inter-disciplinary research to study the effect of awareness-based meditative practice on teamwork during DfSI projects.

Awareness-based meditative techniques (AbMTs) have been studied using a variety of quantitative tools and qualitative techniques. One such tool is HRV, which measures ability to deal with stress as an indicator of effective AbMT practice and has been considered a useful concept for verifying the practice of AbMT intervention during this research. However, professional and personal development depends on the learning mechanisms as well as the right attitude employed to achieve competence and excellence, which needs to be considered while researching the effects of AbMT. Building the right attitude rises out of core inner values, which are the worth of things, concepts and people in the mind of a person (Thompson, 2013, p. 34). The internalised system of inner values determines the actions and overall behaviour of a person or people (Perloff, 2010, p.92-101) but lack universal definitions in the context of teamwork during DfSI project. Therefore, the inner values important for teamwork during DfSI projects and those which are affected by practice of AbMT have been recognised from literature as; Hopefulness, Generosity of spirit, Forgiveness, Patience, Acceptance, being Non-judgemental and having a Beginner's mind. These have been defined using relevant literature and the criteria to identify these inner values have been proposed as a model in table 2.1.

Based on such an understanding of Design research, the goal of this research is to evaluate the changes that occur due to AbMT practice on teamwork during DfSI project by building knowledge around three fields of knowledge shown in the figure below.

Figure 2.11: Three fields of knowledge studied through literature

Chapter 3: Research method

The chapter introduces the research methodology and describes the need for mixed research methods for this research. The chapter also explains the AbMT intervention and the mixed method of data collection technique and the strategy for analysis for qualitative and quantitative data.

3.1 Purpose of Chapter

This chapter describes the research strategies and methods appropriate for conducting the research. The strategy is based on the use of mixed-methods. The procedures, challenges, ethical considerations, risks and contingency measures for the research are explained, together with the creation of the appropriate intervention: the data collection process and the strategy for its analysis. Finally, a critique is made of the limitations of the mixed-method research. The selections of the participants and the case study projects for this research are discussed in the Chapter 5.

3.2 Research Methodology

It is important to build a systematic research approach from a well-formed understanding of the context. Based on the review of key literature, the hypothesis of this research is that, 'the practice of AbMT can improve teamwork during DfSI projects'. This hypothesis depends on the act of becoming aware through AbMT practice to lead to improved interaction, which in turn leads to the development of teamwork. The intention of this research is to understand and recommend practices for the professional development of DfSI teams, to make them collectively cognizant of the issues of developing awareness based on inner values, and how these maybe beneficial for teamwork. Inductive reasoning has been used to frame a theoretical perspective and a philosophical understanding. Deductive reasoning is used to prove the proposed theoretical perspective (Shown in figure 3.1).

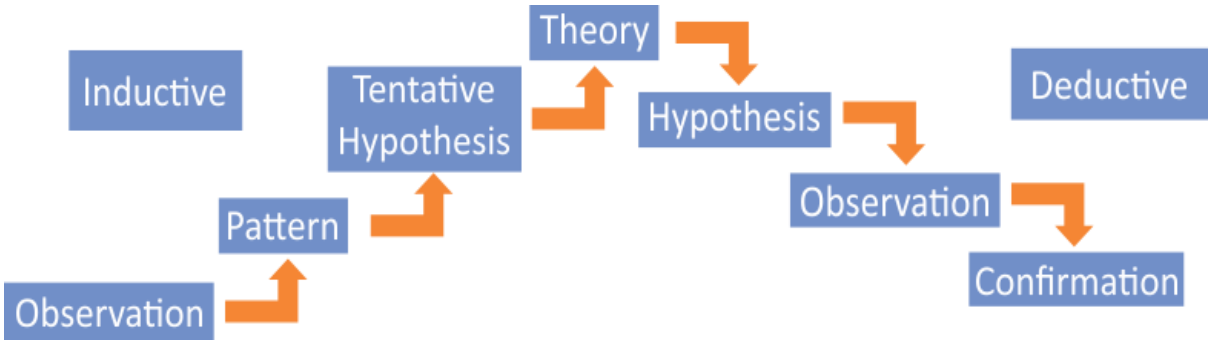


Figure 3.1: Inductive and Deductive reasoning for research
(Adapted from Creswell, 2013)

A post-positivist world-view can be seen in this research during the empirical observations and measurements through quantitative and qualitative research methods. The reason for awareness-based intervention being effective is probably best described by Scharmer (2010, p.5):

> "*When we are present and aware to ourselves we are always in a better position to act. We are not lost to ourselves in the past or future, places that we cannot act from now. When we are present to ourselves, we have all the full potential of our mind with us. This allows us the space and attitude to act from a creative and wise mind.*"

Thus, it is expected that an appropriate AbMT intervention should bring observable changes to teamwork during DfSI projects. To observe such changes, appropriate research strategies of inquiry need to be determined based on past research from similar contexts, addressing similar problems. A systematic approach to research requires a research strategy and research design to identify the appropriate research method.

3.3 Choosing an appropriate Research Strategy:

To choose an appropriate research method, it is important to understand research strategies and then to choose the most appropriate strategy based on the context of the research. Therefore, established quantitative methods are explained to verify the intentional and genuine practice of AbMT.

3.3.1 Qualitative Research Strategies for understanding teamwork during DfSI projects

Case study is a strategy for qualitative research and has been traditionally used by researchers in the Social Sciences and related fields of knowledge. By using a case study strategy for research, the researcher can address complex situations that surround real-world projects and analyse the changes in their multiple complex variables (Yin, 2011). The criticism is that researcher's subjective interpretations enter such analysis processes. Thus, to bring objectivity, researchers clearly define the strategy and process prior to data collection and analysis and often weave in empirical evidence within the narration. Therefore, this research adopts a case study approach and clearly defines the strategy and process of data collection and analysis and weaves further understanding through alternative qualitative approaches.

Within the field of design, an alternative to case study is action research strategy, based on reflective practice, which is sometimes called Participatory research. Participatory research is Schön's (1983) contribution to research in the field of design. His teachings brought forth a practice-oriented approach to action research, leading to the dawn of an era of 'research-through-design', where the term design refers to the professional activity (hence the small d). The researcher is not merely a passive observer in the participatory approach to research, he/she is most often the researcher actively involved in the creation of new knowledge. The most important data comes from the reflections of the designer, referred to as the 'reflective practitioner' (Schön, 1983). Through the analysis process, called reflection-in-action, the researcher creates insights of the process of design (the act of designing). Finn (1994) suggested the People-Power-Praxis explanation of participatory research in the field of design, where research on design is 'people-centred', supports 'empowerment' and recognises the 'inseparability of practice and theory'. He takes a positivist approach and explains that conducting design research as a practitioner requires the researcher to become reflective and brings subjective experience into the collected data, which has been criticised on three grounds. Firstly, the analysis process and the evidence generated are bound in time and activity, so they are neither replicable nor provable, a problem that persists from the case study approach (Trabucco and Milano in Creswell, 2013; Yee, 2007). Secondly, because subjective insights of the researcher bring value to the participatory approach, the only empirical evidence is usually the outcome of the design activities, which justifies the success of the process (Sevaldson, 2010). Thirdly, critique of Action Research Reflective Practice shows that when a person acts both as a reflective practitioner and a designer, there is a problem because a person cannot be in creative flow and be reflective simultaneously (Love, 2002). Because of these drawbacks, the reports generated from participatory action research approaches, are overly indulgent around discussion on methodology and the effectiveness of the intervention but not for analysing effectiveness of teamwork. This research takes a post positivist approach to research, but will not apply participatory action research strategy as it does not suit the context of team work where opinion of members, including those of the researcher, should be considered important. Therefore, this research will collect data from design teams during DfSI projects which will be analysed by the researcher.

Valkenburg and Dorst (1998) conducted explorative study and proposed a new method that overcomes the criticism of subjective interpretation that ails participatory methods. The method has been used to understand activities of design teams and uses a set of criteria

derived from Schön's 'reflection in action' as an evaluation technique. The rationale for data collection is that "*as an exploration, one would like to observe design teams working on a design task, preferably in a real-life situation, and constructing a rich description of what the team is doing*" (Valkenburg and Dorst, 1998). They further explain their method of analysis as, "*in this explorative study, we attempt to describe team designing in a manner that provides a survey of the teams' activities and that can be a starting point for analyzing team design behaviour.*" The survey of design activity as starting point for analyzing team design behaviour has been adapted during this research, where reflections from multiple designers will be gathered to analyse their team design practice during this research. Such analysis will use classification of design activities as proposed by Valkenburg and Dorst (1998) and depicted in figure 3.2. They explain, "*in order to recognise the four different activities* (of design) *we have to look at what the team is doing and which goals they have in mind*" (p. 255). They used the method of observation to understand the activities of the design process and categorise them to identify the elements of effective practice of design. The protocol for defining the four activities as explained by Valkenburg and Dorst (1998) is as follows:

Naming: Any action recognizing objectives by revisiting the expectations from the design brief of the client lets the team move forward and this process of designing has been called as *naming* activity. Thus, when the team members point out the parts of the design brief or try to understand relevant requirements of the project, this is coded as a *naming* activity.

Framing: Framing activity is where the team members set a 'context' for looking at a problem space or solution space, where a frame is "*something to hold onto and to focus on while designing*" (Ibid, 1998 p.255).Valkenburg and Dorst (1998) recognize framing activities when team members form strategies for further design activities that let the team ideate in a specific direction. They explain that framing is where further activities occur and therefore visualise it as a box within which moving and reflecting occur. Thus, planning a project, sharing responsibility or any other activity that lets the project become organized for successful execution of core designing can also be considered as a *framing* activity.

Moving: When the members of a team, progress towards experimentation to create a set of ideas by sorting information, creating solutions and combining ideas, this can be identified as a *moving* activity. Such activities not only create ideas, but also identify the suitability of the frame. Therefore, the activity of moving is characterised by a verb, but it is also important to recognize the correct context in which ideas are being generated.

Reflecting: When the team members assess the validity of an earlier activity to determine the next steps, it is coded as reflection. The reflecting activity is not only about ideas, but the process, the actions, the decisions and the plans made in the past. Such reflection may include a review of one's own actions and behaviour while applying the process of design.

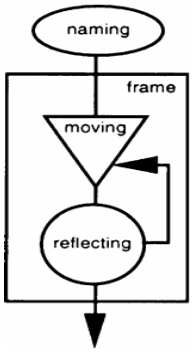


Figure 3.2: Visualizing the four design activities applied by team (Valkenburg and Dorst, 1998)

Like any model, the proposition by Valkenburg and Dorst (1998) also has limitations. The proposition from Valkenburg and Dorst (1998) is based on "*industrial design students developing design abilities*" (Ellmers and Foley, 2007). Thus, the context proposed is different to that of this research, which is DfSI. Because of this, many different activities could fall under the umbrella of framing, such as, project planning, discussion on teamwork, justification for a viewpoint and also the framing activity in the traditional sense of the word. As opposed to this, Lawson's (2006) proposition of categorising design activities is much finer with considerations for activities such as formulating, representing, moving, evaluating, reflecting, with room to explain sketching, synthesising, co-evolving problem and solution etc. But the model proposed by Valkenburg and Dorst (1998) helps to appropriately describe design activities that happen in team setting and has reflective practice at its core. Further, it provides a structured and clear approach to understanding design led innovation which is transferable to research in an inter-disciplinary setting, something which is lacking in current literature (See section 2.2.2).

3.3.2 Quantitative research strategies to verify effective practice of AbMT

In the last two decades, both qualitative and quantitative researches have been carried out using a variety of AbMT interventions in order to address research questions in different fields of knowledge. These fields include; Design (Spencer, 2008), Social Science

(Bainbridge, 2012), Evolutionary Biology (Varela, 1993; Nowak and Highfield, 2011), Education (Barab and Squires, 2004), Psychology (Siegel, 2015 and 2007; Guo and Powell, 2001), Medicine and Psychiatry (Rauch et. al., 2014; Kabat-Zinn, 1995; Davidson et. al., 2007). Research strategies for this research ranges from the qualitative strategies, predominantly used in social science, education and design research, to the quantitative strategies, which have been used in Psychology, Medicine & Psychiatry and Evolutionary Biology. The key strategies of enquiry that can be utilised for studying AbMT are discussed below in the context of design research.

Quantitative Experiment-based strategies provide scientific empirical evidence that is reliable (provable) and replicable (Creswell, 2013). These strategies usually divide the participants into two groups; one group receives an intervention to their normal way of working while the other does not and acts as a control to the experiment. Experiment-based strategies utilise clinical settings where variables influencing results are controlled and therefore, are rarely used for research in the field of design (Barab and Squires, 2004), which is rooted in a real-world setting and handles multiple complex variables influencing results. However, during this research, such a strategy is considered to be useful to monitor the physiological stress of participants at different stages of the project, so as to evaluate the effective practice of AbMT intervention. The Experiment-based strategy used during this research is Heart-Rate Variability (HRV) because of its established usefulness in analysing the effects of AbMT interventions.

It is important to note that the Experiment-based research strategies require specialised training of certain tools and techniques. Similarly, training and knowledge is required for appropriate analysis to correctly interpret the meaning from the data. For example, proving the relation of HRV to the Autonomic Nervous System (ANS) (discussed in detail in section 2.8.2) requires use of heart rate monitors for data collection and also requires adequate knowledge of physiology for analysis (Rauch et. al., 2014). Incorrect interpretations drawn due to a lack of expertise can lead to faulty conclusions. Therefore, this research utilises pre-defined statistical analysis to identify the effect of a stress inducing Stroop test[9] on HRV (Rauch et. al., 2014). However, the outcomes from such experimental strategies are not descriptive but it is important to verify that the stress is arising from psycho-physiological

[9]Stroop test creates psycho-physiological stress using computer game technique. It is a cognitive ability and performance test.

factors. Therefore, psychological questionnaires are used to complement the Experiment-based research strategies.

Quantitative-Psychological research strategies stem from non-experimental, quantitative strategies and consist of scientific (often inappropriately criticised as pseudo-scientific) methods for data collection and analysis. These are mostly surveys using psychology-based questionnaires derived from an understanding of human psychology and tested rigorously for their effectiveness with a particular demographic dataset. However, such a self-reporting research strategy can bring about the problem of Hawthorne effect[10]. Therefore, such questionnaires are usually coupled with a more robust Experiment-based strategy, which is what this research adopts as strategy. Some of the usual Psychology-based questionnaires used along with HRV for the research on AbMT practices include; the Mindful Attention and Awareness Scale (Brown and Ryan, 2003), Gratitude Questionnaire (McCullough et. al., 2002), Oxford Happiness Questionnaire (Hills and Argyle, 2002) etc. These psychological questionnaires enable objective self-reporting and provide empirical evidence that is rooted in rational explanation and are considered reliable because the results are replicable. The questionnaire for assessing AbMT interventions during this research is the Mindful Attention and Awareness Scale (MAAS) questionnaire that helps to understand the psychological state of individuals at a given point in time.

Thus, for this research both qualitative and quantitative strategies from different disciplinary backgrounds are needed to create a depth of knowledge. The qualitative strategy proposed by Valkenburg and Dorst (1998) has been used as a sense-making technique to understand design team behaviour during DfSI projects, along with the thematic case study approach. The quantitative strategies utilized during this research include the HRV measurement along with a psychology-based questionnaire to gather evidence of the effective practice of the AbMT intervention by the participants. The qualitative and quantitative strands together aid the comparison of the DfSI projects by participants who undergo AbMT intervention and those who do not. This generates the need for a robust, mixed-method research design to effectively apply both strategies of research and to collect and analyse the data so that the two strands complement each other's strengths and reduce each other's drawbacks.

[10]The *Hawthorne Effect* is the process where human subjects of an experiment change their behaviour, simply because they are being studied.

3.4 Selecting the appropriate Mixed-method research design

Mixed-methods research is, "*empirical research that involves the collection and analysis of both qualitative and quantitative data*" (Creswell, 2013, p.293). Designing a research study with quantitative or qualitative research alone is challenging enough. The complexity is much higher for mixed-method research and that is the reason why a thorough understanding of the strategies is used for designing this type of research. Though any two mixed-method studies will never be alike, Creswell (2013) points out four key principles to help researchers navigate the process of mixed-method research. The principles are:

1. Decide about the research design: is it a fixed or an emergent study.
2. Recognise the design approach: is it typology based or a dynamic approach.
3. Match a design project to the research problem, purpose and question.
4. Be explicit about the reason for mixing methods.

These principles are discussed below to identify the most suitable mixed-method research design by exploring the research strategies applied during this research.

1. Decide about the research design: Fixed or emergent study

Fixed research refers to a predetermined design for research. An emergent design for research is the one that evolves during the course of the research. As discussed above, the need for fixed research strategies was identified after the review of literature during this research. Robust research methods were determined, which have not changed during the course of this research. Based on this pre-recognised need, relevant training was acquired by the researcher (See section 3.4.2), and investment was made into obtaining resources, tools and ethical approvals. So this research applied a fixed research design and not an emergent one.

2. Recognise the design approach: typology based or a dynamic approach

Mixed-method research has been widely classified. Creswell and Clark (2007) have summarized these classifications into 15 categories. Although it is not necessary to know all of these classifications to select an approach for this research, it is important to choose the correct one by a method called a typological approach. On the other hand, the approach to create a new personalised research design that inter-relates multiple components instead of choosing one approach from an existing typology is called a dynamic approach. Creswell (2002, p. 80) provides a method to identify the correct topology by asking a series of questions:

a) What will the timing of qualitative and quantitative methods be?

The qualitative and quantitative methods can be applied concurrently or sequentially. If they are applied sequentially then either can come first (Creswell, 2002, p. 80). For this research both the qualitative and the quantitative data have been collected concurrently.

b) What will the weighting of the qualitative and quantitative methods be?

During a research project, the qualitative and the quantitative methods can have either equal or unequal weighting. If the weighting is unequal, then the mixed-method has either a qualitative emphasis or a quantitative emphasis (Creswell, 2002, p. 80). For this research the weighting of qualitative and quantitative methods is equal.

c) How will the qualitative and quantitative methods be mixed?

The mixing of qualitative and quantitative methods can be done in three ways: Merging the data, embedding the data and converging it. The merging of methods can be done during implementation or during analysis. For embedding, either quantitative data is embedded in the qualitative design or qualitative data is embedded into the quantitative design. The convergent design can be either qualitative data building into quantitative or quantitative building into qualitative (Creswell, 2002, p. 80). For this research, the quantitative analysis builds into the qualitative analysis by confirming the effective practice of AbMT intervention by the participants.

Thus, the typological understanding brings to light that this research uses equally weighted quantitative data in a qualitative approach. This process has helped bring understanding to the design of the mixed research method to be applied during this research.

3. Match a design project to the research problem, question, purpose, and aim

The research problem explored in the literature included the lack of collective leadership and the need for professional growth through the act of becoming aware (See section 2.3.3). As the premise to understand the act of becoming aware during this research stems from contemplative practices, the research question posed during this research is; 'Can AbMT practice positively affect teamwork during DfSI projects?' Therefore, the aim of the research is to investigate 'the effects of Awareness-based Meditative Technique (AbMT) on the teamwork applied during Design for Social Innovation (DfSI) projects'. Both qualitative and quantitative methods are important because, this research aims to gain qualitative insights into the development of teamwork during DfSI projects, due to practice of AbMT

intervention and needs quantitative insights to confirm the effective practice of such AbMT intervention.

4. Be explicit about the reason for mixing methods

The reason for selecting mixed research method to answer the research question and achieve the aim defined above, needs to satisfy two objectives:

a) Firstly, the quantitative method corroborates effective practice of the AbMT intervention.
b) Secondly, the qualitative method investigates the effective teamwork during different DfSI projects.

The intention behind using a mixed-method from different disciplines is to bring together the different strengths and the non-overlapping weaknesses of qualitative and quantitative research methods. For recognizing such weaknesses and strengths during this research, the quantitative and the qualitative methods exploit certain 'Variables' and 'Cases' (Creswell, 2013, 292). For the quantitative research, the variable selected is Heart Rate Variability (HRV) score (See section 3.5.2-b for information of HRV) that can confirm the effective practice of AbMT intervention by individual participants based on improved response to stress, which is created by the 'Stroop' test. Another variable is the Mindful Attention and Awareness Scale (MAAS) (Van Dam et. al., 2010), a questionnaire which quantifies the dispositional awareness of individual participants. The cases are built using qualitative analysis of data using a thematic analysis method to understand teamwork during a DfSI project. Such understanding is supported with Valkenburg and Dorst's (1998) explanation of design activities. These cases are further understood in terms of the inner value system by applying the model proposed from the review of literature (table 2.1). Thus, the reason for mixing different qualitative and quantitative methods is based on the aim and objectives of this research, which is the need to understand the effects of AbMT on teamwork during DfSI projects in terms of cases after verifying effective practice of intervention by the participants.

3.5 Inter-disciplinary mixed-method research

The mixed-method research design discussed above requires specific procedures to be followed and contingency measures to be taken for commonly occurring challenges, ethical considerations and risks. These are discussed in this section. These were disclosed to the participants using a 'Participant Information Sheet' (See Appendix 2).

3.5.1 Procedures for the mixed-method

During this research the procedure for quantitative data collection and analysis using Heart Rate Variability (HRV) has been adopted directly from Rauch (Rauch et. al., 2011) and his data collection process is explained in detail in Section 3.6.5-a. These were learnt at the School of Health Science and Sport science, Cape Town University, South Africa. The procedure for quantitative data collection and analysis using the MAAS questionnaire has been adopted directly from Brown and Ryan (2003) and this data collection technique is explained in Section 3.6.5 b. A blank MAAS questionnaire is shown in Appendix 3. The analysis of the quantitative data is explained in Section 3.7.1.

The qualitative data collection is focused on the teamwork during DfSI projects as applied by the participants. The technique of the 'Reflective Practitioner' by Schön (1983) has potential to create a path to gaining reflection in action and thus can provide an account of the design process that is varied and insightful. This research uses an adaptation of Schön's work as explained by Valkenburg and Dorst (1998), to create depth and some width of information. Further depth is attempted by applying the proposed model of inner values to the same data and presenting a snapshot of the inner value system that may have existed with regard to aspects of teamwork during the DfSI projects. To collect data on such aspects, a list of open-ended questions has been created for the semi-structured interviews to investigate different themes around various aspects of the DfSI projects.

Thus, the mixed-method approach during this research explores the depth of information regarding the changes that participants demonstrate while working in teams during DfSI projects. The procedure for quantitative data collection and analysis has been adopted directly from Rauch et. al. (2014) and Dryden and Wells (2006) and the procedure for thematic qualitative research has been adapted from O'Connor and Gibson (2003), Valkenburg and Dorst's (1998) interpretation of Schön's (1983) 'Reflective practitioner', along with the proposed model of inner values (refer table 2.1) created from the review of interdisciplinary

literature (see section 2.5.1) and reviewed for face validity by expert design practitioners (see supporting study in section 4.2).

3.5.2 Challenges associated with choosing the mixed-method research design

Mixed-method research is a challenging research design because:

a. The researcher requires being an expert in both qualitative and quantitative data collection techniques. This requires extra time and effort. One of the ways to address this problem of multiple expertise is to form a research team made up of members with expertise, either in quantitative or qualitative research methods. Another way is by investing in the training of a single researcher to gain expertise in both quantitative and qualitative research. For this research, appropriate training and guidance helped the single researcher to collect and analyse both qualitative and quantitative data. Northumbria Research Funding was used to derive training in qualitative and quantitative research from the research training programs at the University of Northumbria. Further, funds were acquired from a MATSIQEL[11] grant, which were used to acquire training in the research ethics and techniques of quantitative data collection and analysis of Heart Rate Variability (HRV) from the School of Health Science and Sport Science at Cape Town University, South Africa and from the Faculty of Health Science and Sport science at the University of Northumbria. The training was delivered by Dr. Laurie Rauch, a renowned physiologist and researcher at Cape Town University, from September 2012 to March 2013. The training entailed two months literature-based training in research ethics for Heath science research and quantitative research techniques using Heart rate Variability. This was followed by three months practice study with an MSc student, to apply and acquire ethical approval from the School of Health Science & Sport Science, Cape Town University, to gather data from appropriate participants in South Africa and to analyse the data appropriately (this data and analysis is published as an MSc Thesis by Stefano Scribani at Cape Town University). Finally, a two-month long review of relevant literature and appropriate research methods was conducted to successfully apply for ethical approval to conduct this research in

[11]MATSIQEL (Models for Ageing and Technological Solutions for Improving and Enhancing the Quality of Life) is a planned programme to support international exchanges between researchers internationally and, importantly, in a distinctive and unique combination of disciplines.

accordance with regulations set out by the Faculty of Health science and Sport science and by the Faculty of Arts, Design and Social Science at the University of Northumbria.

b. Another challenge faced commonly during mixed-method research is having different sample-sets and different sample sizes. This makes merging of the two data sets difficult (Creswell, 2013, p. 80). Different sample sizes occur when the quantitative and qualitative data are collected to achieve different purposes (e.g. generalization versus in-depth description, respectively). It can be challenging to merge two sets of very different data and their results in a meaningful way. For this reason, the sample set and the sample size have been deliberately kept the same during this research, so that qualitative and quantitative outcomes can be compared easily. The position taken during this research is that the sample size depends on the research design (Creswell, 2013, p. 189). For the quantitative research, the appropriate sample size has been determined to be above 10 participants using Creswell's criteria (Creswell, 2013, p.169). A qualitative research method uses a lesser number of participants (Creswell, 2013, 189). Therefore, participants have been divided into teams to create clusters of 4 to 5 participants in each team.

c. In mixed-method research, the researcher needs to design his/her own study after identifying the appropriate methods. This entails a properly defined data collection method and strategy for analysis so that the quantitative and qualitative data provide findings that can contribute to the context of the research. For this research the selection of mixed-method research design is explained above, the data collection strategy has been explained in section 3.6 and the data analysis strategy has been explained in section 3.7.

3.5.3 Ethical considerations for mixed-method research

3.5.3.1 Anonymity

Anonymity has been the crucial aspect of this data collection process. For this purpose, both qualitative and quantitative data were processed prior to analysis. The data was made anonymous by coding information pertaining to each participant.

3.5.3.2 Confidentiality

During the post project interviews, the participants were instructed to reflect on different aspects of their teamwork during the DfSI project. However, during the interview, some

participants mentioned the names of their team members, or names of projects from their past. These could potentially affect anonymity. Also, requests for confidentiality from participants regarding sections of their own interview were honoured. For these reasons, words, phrases or names which could reveal identity of participants have been either removed or replaced by appropriate codes.

3.5.3.3 Validity

Validity of the data depends on the type of data (Creswell and Clark, 2007). Expert DfSI practitioners have reviewed the proposed model of inner values for face validity[12] using a descriptive survey method (See section 4.2). Construct validity has been achieved by bringing together different methods which measure the different effects of AbMT intervention on teamwork during DfSI projects.

The validity of quantitative data collection has been achieved by robustly defining strategy (see section 3.6.5) and by verifying internal validity of tools, process and procedures used for quantitative data collection using supporting study (see section 4.4). The validity of quantitative analysis is achieved by pre-defining hypothesis (see section 3.7.1) and by using data in normal form after understanding abnormalities in the data (see section 6.2).

The validity of qualitative data collection process is achieved by robustly defining the data collection strategy (see section 3.6.6). The validity of the process of qualitative analysis has been achieved by defining robust method which is rooted in literature. This is achieved by using the explanation of design activities by Valkenburg and Dorst (1998) coupled with steps for thematic analysis proposed by O'Connor and Gibson (2003) and followed by understanding value-system by applying the proposed model of inner values (See section 3.7.2). The internal validity of the process of qualitative analysis is achieved through a study of inter-rater reliability (see section 4.3).

Thus, quantitative data was validated for normal distribution (See Section 6.2) and validity of qualitative data and analysis is maintained by adopting established methods, and verifying procedures using review by experts (See section 3.6.5).

[12]Construct validity refers to the ability of a measurement tool (e.g., a survey, test, etc) to actually measure the psychological concept being studied. It is the test of the appropriateness of a proposed model.

3.5.3.4 Risks to the data collection and contingency measures

Different risks were identified before starting this research and contingency measures were planned accordingly. The contingency measures for two major risks that occurred during this research are described below:

Risk 1. Withdrawal of information by participants during or after data collection

This risk had a high probability of occurring and a high impact if the risk occurred. This risk was mitigated by addressing any concerns over the anonymity of participants. The participants were informed of their rights using a Participant Information Sheet (See Appendix 2) and were regularly updated on how the data was being coded and their anonymity and confidentiality were being maintained. The regular updates helped build participants' confidence in the process of data collection, storage and use. During this research, one of the participants requested partial withdrawal of some of the information shared during a qualitative interview. The participant's request was noted in detail, transcripts were redacted accordingly and a copy of the transcript was provided to the participant for approval. The contingency method for withdrawal is to make sure most members from the teams being studied participate in the research. If more than half the members of the team withdrew their participation, then the team's data would not be considered sufficient and the team would have been dropped from the research. However, this did not happen and the participation from every team was 75% or higher.

Risk 2. Technical problems and Erroneous data

There is a high risk of device malfunction when working with any technical equipment. Impact of such risk is also high because it can affect the results and conclusions drawn from quantitative analysis. Therefore, Dr. Laurie Rauch, an expert on HRV data collection processes and his MSc student Stefano Scribani volunteered to help in setting up and calibrate the devices for quantitative data collection and to identify technical challenges and device contingency measures. The HRV data collection used a chest strap to mount the monitor on the participants. The recognised risk was the failure of the electrodes and errors due to dead skin and dirt. For this reason, wet wipes were used to clean the skin and a fresh set of electrodes were used for each HRV data collection. Another risk recognised was the loss of data in the event of device failure. Therefore, the data was backed-up immediately after it was collected from each participant and an adequate time gap was kept between the data collection sessions of two participants, to enable back-up as well as avoid the risk of the

participants becoming agitated due to delays, which could affect the qualitative and quantitative data they provided.

The risk regarding erroneous data was mitigated in this research by choosing appropriate devices, adopting robust protocols, and conducting a pilot-study to verify the appropriateness of the device by the standards set for research (shown in section 4.4). Further, the software selected for quantitative data collection also had inbuilt contingency measures for collecting clean data and dealing with erroneous data. To cope with noise in the data, the device captured Heart Rate data for more than 120 seconds and considered the best 90 second section of data for calculation.

During data collection, the data was quickly verified manually by comparing HRV readings to investigate any unexpected results, so that reasons for such results could be discussed with the participant during the debriefing session. After the data was collected, quantitative data was again verified manually, this time for normal distribution using a goodness of fit test (Myers, 2010; Rauch et. al., 2006). This helped to identify any outliers, which could skew the data set. If such outliers were recognised to be erroneous data, they were dealt with by appropriate error-correction methods (explained in section 6.2).

3.6 Data collection in the context of this research

As seen from the above section, an inter-disciplinary mixed-method is best suited for this research to collect the depth of data required. The procedure discussed above outlined the guidelines for effectively mixing the qualitative and quantitative methods. This section explains the strategy to collect data from the two concurrent qualitative and quantitative strands. Before going into the detail of each of these strands, the information about the AbMT intervention is explained below.

3.6.1 Constraints for AbMT *intervention:*

As explained in the literature review (Section 2.4), research has provided evidence (Brown and Ryan, 2003; Kabat-Zinn, 2003, p. 2) that physiological stress, such as the tightening of the shoulders, hands or neck, increased heart rate or blood pressure are a result of and therefore, indicators of a stressed mind. A stressed mind modifies a person's perception negatively, influencing the person to behave ego-centrically and hinder the double-loop learning required for development of professional practice required for teamwork during DfSI projects (Lazarus, 2006). Creating a breathing space to bring attention to the tensed body and to a negative mind-set helps to build awareness toward one's own actions, decisions and can help teamwork during DfSI projects. Thus, an appropriate AbMT intervention is required to understand the effects of meditation on teamwork during DfSI projects.

Practitioners, researchers and experts explain that a daily practice of AbMT for 20 minutes is necessary to build and maintain the state of awareness (Guo and Powell, 2001; Chopra, 2010; Miller, 1999). However, an untrained mind cannot hold attention during meditation for such a long period of time. If non-practitioners need to be engaged in meditative practices, then they need to start with shorter periods of time and slowly increase the span of their practice (Miller, 1999). Different traditional approaches give different techniques for increasing the practice of meditation, but they all use a very similar technique for beginner level practitioners to start meditating. The average length of meditative practice session appropriate for a beginner could be between three and seven minutes, because this is the average time an average person can hold his attention without getting anxious or irritated (Dukette and Cornish, 2009). The meditation needs to be guided and the first few sessions need to be in the physical presence of an expert so that required adjustments can be made and questions can be answered. The posture for most meditative practices is a sitting position, either on the ground

or on a chair (the ground is preferred). Maintaining posture that allows one to relax and allows one to remain alert and aware is important. An uncomfortable posture is distracting and unpleasant and it is discouraging, especially for a new practitioner. The relaxation of the body needs to be guided by use of metaphors (Miller, 1999). The tool at disposal is one's imagination and should be used for moving the attention from outside the body to inside of the body. Experts discourage thinking during the meditative state. However, this is not usually associated with novice practices. The three key parts of a meditative session are; relaxing the body and building an alert posture so that attention can be brought inside the body, maintaining the relaxed state of body and mind while bringing attention to one place, usually within the body, such as breathing, and lastly, to guide the practitioner out of the meditative state by bringing one's attention slowly outside the body while maintaining a relaxed state of body and mind. Such guided meditation can be conducted in three minutes and has been referred to by many authors as 'Three-minute breathing space' (Didonna, 2009; Holmes, 2009; Crane, et.al., 2007; Semple, Lee and Miller, 2006; Baer, Fisher and Huss, 2005). This technique has been associated with the introduction of meditative technique to new practitioners because it is easy, guided and short in length and it requires basic understanding of meditation technique.

Based on the above description of meditative practice of the 'three-minute breathing space' derived from literature, a customised awareness-based practice was developed for this research during a three day workshop with expert level meditation practitioners from different religious backgrounds, medical professionals and psychiatrists. The goal of the workshop was to create an AbMT that is religion neutral and best suited for clinical and research purposes to be applied to participants who have never meditated before. The expert level practitioners had practiced meditation for more than 10 years and on an average had 20 years of meditation practice. These included Dr. Bisong Guo with more than 25 years of practice and Theresa Poon with more than 10 years of practice in Taoist Chi Gong (Chinese) meditation, Wind Eagle and Rainbow Hawk with more than 30 years of practice each in Mayan (Ancient Western) meditation, Jane Corbett with more than 15 years of practice in Buddhist (Ancient eastern) meditation and Mindfulness practice, Vinay Gulati with more than 15 years of practice in Raaj Yoga (Ancient Indian) meditation, Dr. Andrew Powell, the founding chair of the Psychotherapy and Spirituality Special Interest Group of the Royal College of Psychiatrists (RCP) at Oxford University, Dr. David Reilly with 20 years of experience and Audrey Lyon with more than 10 years of experience as a GP at NHS Glasgow

and founder and an integral part of the WEL[13] course. This guided practice has been associated with providing a way to step out of automatic pilot mode and become relaxed yet alert and aware (Baer, 2003; Crane, 2013, Davidson et. al., 2012, Kabat-Zinn, 2013). The short length of the 'three-minute breathing space' makes it suitable for someone who is new to contemplative practices. The length of such practice is long enough to relax the mind and body, but short enough that people do not fall asleep or get annoyed. The instructions for the guided meditation are described in the next section.

3.6.2 The three-minute breathing space

"This is a three-minute relaxation to experience peace and calm at a deep level.
Please remain with the process until the end
Sit on a chair with your feet on the floor and your back straight.
Let go of any tension and totally relax. Let the arms rest straight down beside your body or;
Put your hands on your lap, hands on top of each other, right hand on top of left for women and left hand on top of right for men, with your thumbs touching.
Close your eyes, relax the space in between your eyes with the face relaxing and smiling
Close your back passage. Slightly contract your abdomen.
Rest the tip of your tongue gently on the roof of your mouth. Close your mouth.
Bring your chin slightly backward. Drop your shoulders down.
Feel as though the top of your head is hanging from the sky, you are sitting upright with no effort, your body relaxed and your spine constantly stretched between heaven and earth.
Relax the muscles at the top of your head, relax your neck
Your shoulders, upper and lower arms, your hands, feel your muscles loosen,
Relax your spine, your hips, your knees, your legs, your ankles, your feet and your toes.
*You feel totally relaxed; each muscle is so heavy that you cannot move. There is only one part of your body that moves – your tummy. Breathe deeply and gently down into your tummy, and feel it rising and falling****…. stillness for 20 sec***
Now gradually become aware again of your body. Keep your eyes closed, rub your palms together and massage your face in a circular motion, open your eyes and stretch, gently come back."

[13]The Wel course journey encourages one to learn how to draw on one's own inner natural strengths that grow helpful change, wellbeing and any healing and recovery that is possible by making change in nutrition, exercise, relaxation and meditation plus practical ways to change the relationship to thoughts and feelings. More information is available at www.thewel.org

3.6.3 How AbMT intervention works?

This guided AbMT intervention is divided into three parts. The first part provides guidance through a set of systematic instructions to relax the body and mind. The goal is to bring focus from outside to the inside of the body, become aware of the body and mind, get into a relaxed but alert and aware state. The middle part of the guided AbMT intervention focuses attention to breathing and is the core meditation practice. It tries to hold attention towards the breath while maintaining the relaxed yet alert and aware state. The third part is to come out of the meditative state and bring the body back into an active state. This means bringing attention back from breathing to the body, to outside the body.

The first part starts by establishing the goal of the meditation practice, which is made explicit in the first sentence. Then the first instruction is to complete the practice session till the end. The next instruction brings attention to the mind and body with the agenda to relax them. The usual posture, neutral to any religious practice, is to keep the hands beside the body. However, Chi-gong and Raaj Yoga are ancient eastern traditions that believe in a flow of energy of life through the body. These traditions instruct a different placement of hands for men and women. Other traditional experts who do not consider such energy also do not believe that such an instruction will be distracting to the goal of this attention meditation. This is followed by limiting distractions by closing the eyes and relaxing the face. The smiling face is considered important to the process of relaxation of mind and body and creating a positive feeling. The next instruction is to close the back passage and close the mouth, followed by placing the tip of tongue to the roof of mouth, chin slightly tucked in and shoulders relaxed, helps to keep focus by maintaining an alert body posture. To maintain this posture, the next instruction encourages participants to imagine as if their head is hanging from sky. This instruction puts the spine in the correct posture and avoids drooping. Then the instructions to relax different parts of the body are given. The sequence followed is usually top to bottom of the body, starting from eyebrows and muscles between eyes, followed by muscles on the face and top of the head. Then turning attention to relaxing muscles in the neck, shoulders, arms and hands and loosening the muscles. When the mind is stressed, the muscles in the shoulders and lower back are tightened as an evolutionary response to the fight or flight instinct, making the body ready for action. Relaxing these muscles rids the mind of anxiousness and relaxes it. The instruction for the spine is that it is

important to maintain an alert posture, followed by relaxation of the lower extremities of the body, the hips, legs, knees, ankles and the feet.

The second part of the meditative practice instructs one to hold the posture and the state of the body and the mind. This is achieved by imagining that the muscles and mind are getting heavy, as if being set in the relaxed state. Finally, the attention is brought to the breathing and movements of the stomach that go along with it. Deep breathing relaxes the body by releasing endorphins and slow breathing lowers blood pressure and heart rate. The overall effect of the instruction to focus on breathing, not only helps to regulate breathing, but also helps the mind to stay alert and focused. This state of mind and body is maintained for 20 seconds. This is the section that is increased in length with practice. An expert brings the body and mind to this state and keeps it there for as long as he/she can.

The third and final part of the practice is the most important. It aims to instruct the participants not only how to stay relaxed but also to bring them out of the meditative state. The instructions in this part of the practice include bringing attention away from breathing to the body and toward outside of the body. The warming up of the palms and rubbing warm palms on the face is a soothing feeling. At the same time, the rubbing of palms in psychology is related to positive expectation and rubbing the face gets the participant awake by bringing attention outside of the body.

….stillness for 20 sec

3.6.4 Inter-disciplinary Mixed-Method Data Collection Process

As study of teamwork during the DfSI project in a clinical setting is not advisable (Barab and Squires, 2004), a real-world setting during live social innovation projects was considered best suited for this research for participants to practice teamwork during DfSI projects. Medium sized teams, with four to eight members was considered ideal for the study of DfSI projects (Creswell, 2013). Also, when the length of projects is four or more weeks then teams are better equipped to engage with the DfSI project (Stempfle and Badke-Schaub, 2002). Therefore, for this project DfSI projects for 4 or more weeks were considered ideal for the collection of qualitative data. From the research point of view, it is important that participants are new at designing for DfSI projects and also that they do not have prior knowledge of any meditative techniques. This is expected to ensure the novice level practice and openness to new reflective practices which are the observable changes during this research. Further, quantitative data collection ideally requires data from equal numbers of meditators and non-meditators so that co-relational analysis can be conducted (Cohen et. al., 2013). Also, for qualitative analysis one team with all meditators and another team with non-meditators was considered appropriate.

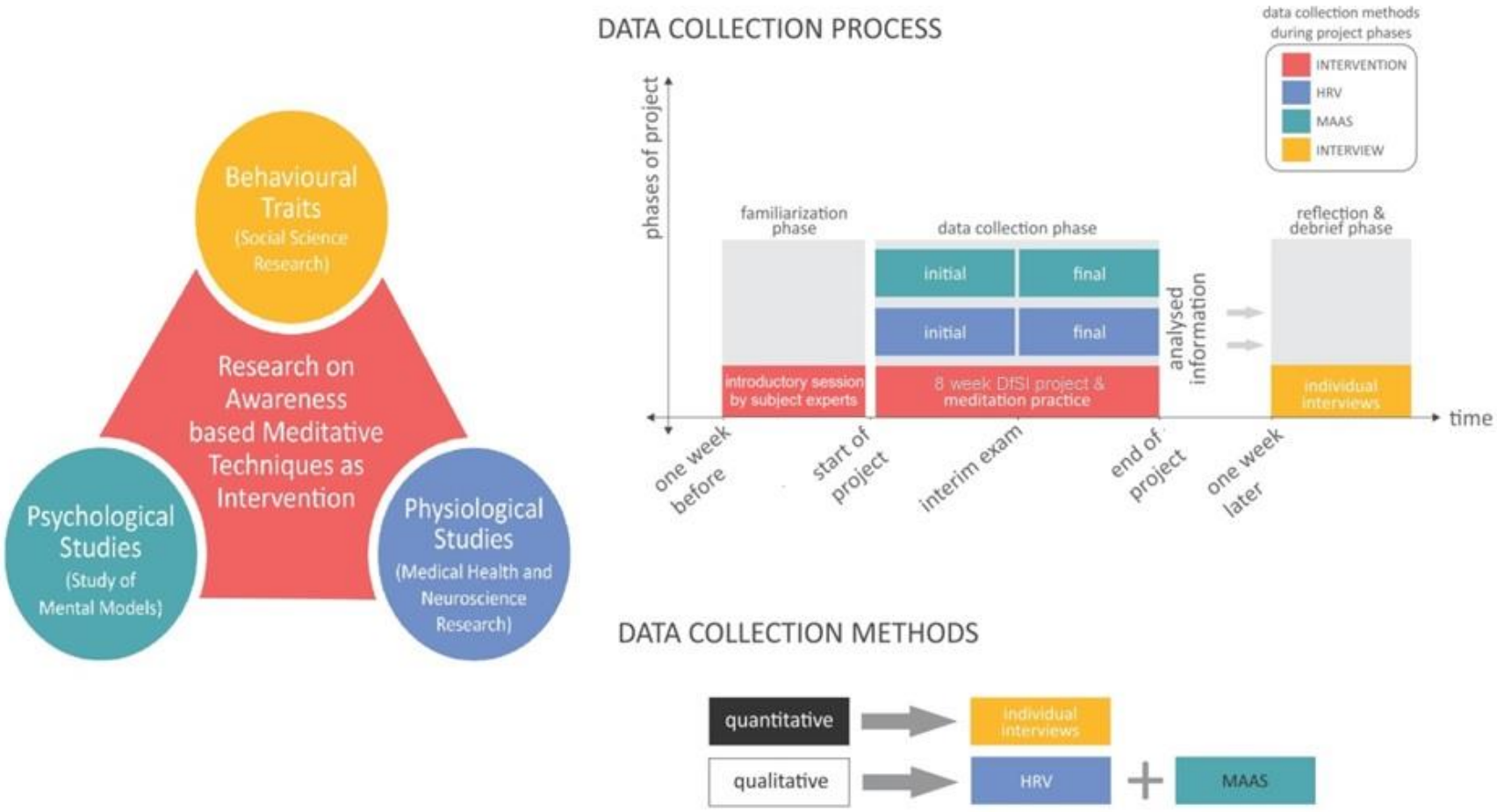
Based on the above criteria, data collection was undertaken in Northumbria University with students involved in the MSc level professional development course called Multi-disciplinary Design Innovation (MDI). Students on this course are involved in real-world projects and work as a part of multi-disciplinary teams to apply design in various contexts. The students are assigned projects rather than choosing the project themselves, so as to simulate real professional opportunism. A large data-set is required when the research focus is on the reach of the effects of an intervention occurs. However, during this research, the exact effects of intervention on teamwork is not known. Therefore, it was important to gather a depth of information rather than width and understand effect of AbMT intervention. A data set of 12 MDI students was considered appropriate for this research. They were divided into three teams to work for eight weeks on three similar, but not the same, social innovation projects. The projects focused on applying DfSI for ideating solutions but the goal of these projects was to focus on the development and not deployment of ideas into the community. This research initially intended to gather data from all the key stakeholders involved in the DfSI project. However, one of the constraints during this research has been the limited access and involvement allowed in the MDI projects with stakeholders and users.

Please note that: further details on the context of the participants and projects are discussed in detail in section 5.2 and are not explained here to avoid repetition.

The data collection process was divided into three phases: the *Familiarization phase* for introducing the AbMT intervention to the participants, the *Data collection phase* for collecting the different quantitative data and the *Reflection and debrief phase* for collecting qualitative data. Figure 3.3 shows the three different aspects of this research colour coded to the data collection process. The first phase of the data collection process, called the familiarization phase, took place one week before the social innovation project began. During this phase, all the participants (meditators as well as nonmeditators) were introduced to all the relevant devices, protocols and shown a step-by-step procedure of the data collection process that would be followed. The participants received an explanation about how confidentiality and anonymity would be maintained and their rights as participants to withdraw the information they may provide during the study or withdraw their participation altogether. During this research, the introductory session was delivered by Dr. Nick Spencer from Northumbria University, who is well acquainted with this research and is also an academic staff supporting the MDI course. During this phase, the participants had also been provided with an introduction and training in AbMT practice. Special precautions were taken not to solicit participants into choosing to practice the AbMT intervention. To avoid priming[14]effect caused by introduction of meditative practice on the teamwork during the DfSI project, the session only informed the participants of the steps for guided meditation and the presentation was done by highly experienced researchers of AbMT. For this research, the training in guided meditation was done by Dr. Bisong Guo and Dr. Laurie Rauch. Dr. Bisong Guo is a WHO consultant and registered GP in Scotland. She is a Doctor of Chinese medicine, Acupuncture and Taoist Meditation. She is also the co-author of the book "Listen to Your Body". She explained the meditation process and decrypted the steps by explaining the role of each step. Dr. Laurie Rauch is a Physiologist in the School of Sports Science at Cape Town University in South Africa and an expert in Heart Rate Variability. He pointed out the physiological parts in the meditation process by referencing to a number of his studies on deep breathing, which demonstrate how to breathe during meditation.

[14]Priming effect is caused by suggestion during training and leads to subtle alteration of behaviour which is temporary and not the true effect of the training. In psychology, priming is a process in which the processing of a target stimulus is aided or altered by the presentation of a previously presented stimulus.

Figure 3.3: The Mixed-Method Data Collection process for this research



Note: The colours schema used is the same as the one used in figure 2.6 to represent the fields of knowledge and is maintained throughout the thesis

After the first phase, the potential participants were given an introductory pack that contained the Participant Information Sheet (Appendix 2), Participant Debrief Sheet and an Informed Consent Form. The participants were given one week to go through the pack, and consider their participation in this research. Using this introduction, the participants could choose to participate in the study as a meditator or non-meditator.

The second phase was called the data collection phase and was as long as the length of the social innovation project. At the beginning of this phase, the participants signed the Informed Consent form. One signed copy was retained by the researcher and the other was given to the participant. At this point, the participants were assigned a random participant number so as to maintain anonymity and confidentiality of the information they would provide. The meditators were given login details to access the guided AbMT intervention hosted on a website created for this research. The second phase consisted of two data collection sessions, once during the initial weeks of the project (usually the second week) and once during the final weeks of the project (usually the second to the last week). During these sessions, quantitative data was collected (this is described further in section 3.6.5). Special precautions were taken to limit the Hawthorne effect on participants, which would lead them to alter behaviour only because they are being observed. This included limited and controlled interaction by remote monitoring AbMT practice through the website, not approaching the topic of teamwork during the eight weeks of the DfSI project and not discussing observations, suggestions or theories of design practice with the participants.

The third and final phase was the reflection and debrief phase. During this phase, the qualitative data was collected using post project semi-structured interviews, where participants reflected on their experience of teamwork during their DfSI project (discussed in section 3.6.6). The interviews were concluded by debriefing the participant with findings of the quantitative research and exploring possible reasons for any physiological changes.

After describing the intervention, selection criteria and phases of data collection, the next section explains the quantitative data collection process in detail followed by the explanation of qualitative data collection process.

3.6.5 The Quantitative data collection for psycho-physiological evaluation

As discussed in the literature review chapter (section 2.4.1), Heart Rate Variability (HRV) is measured as the quantitative data that indicates physiological stress levels and the changes in

HRV indicate the effect of AbMT intervention (explained in section (a) below). Also, the Mindful Attention and Awareness Scale (MAAS) is a psychology based questionnaire that quantifies the dispositional awareness of a participant (explained in section b below).

a. HRV:

HRV is a widely popular method to indicate the physiological stress levels by providing an index of how strongly the autonomic response from the brain regulates the cardiovascular functions (Porges, 1995; Pumprla, 2002; Hjortskovet. al., 2004; Thayer et. al., 2012). Thus, HRV has been utilized for measuring change in physiological stress caused by different interventions such as; physical exercise (Yamamotoet. al., 1991), yoga (Satyapriya et. al., 2009), mindfulness meditation (Ditto, Eclache and Goldman, 2006) and many others. The equipment and the methods of data collection for HRV initially required a clinical setting because of the size and high sensitivity of the measurement devices. Portable devices are now available in the market due to the rising popularity of HRV as biofeedback devices. These devices can be used in semi-clinical settings but are not always as sensitive as their clinical counterparts. In 1996, the Task Force of the European Society of Cardiology (1996) recognised Heart Rate Variability as "*one of the most promising markers of autonomic activity on the cardiovascular system*". However, the task force also warns that, "*the significance and meaning of the many different measures of HRV are more complex than generally appreciated, and there is a potential for incorrect conclusions and for excessive or unfounded extrapolations.*" Thus, it is important to compare the needs of the research with the most appropriate technology, technique and protocol from the available options before selecting the data collection device, level of calculations and method of analysis. Also, it is crucial to utilise only those measures of HRV which are recognised and applied in similar research scenarios and with similar participant profiles. HRV is usually calculated as

$$20ln\,(\text{RMSSD}).$$

where *ln* is a natural logarithm and RMSSD stands for the Root Mean Squared of Successive Differences in the R-R intervals[15] (see section 2.6). The unit of HRV is time, usually in milliseconds.

[15] R-R or R to R interval, also referred to as node to node or N-N interval, is the distance between peak values of each heart beat. It is used to study variation of a heart's beat to beat intervals which have been associated with vagal response from brain to heart.

HRV calculated using RMSSD is widely used as an indicator of physiological stress (Li et. al., 2009; Jo et. al., 2010; Wang et. al., 2012; Plewset. al., 2014). Such HRV data is coupled with cognitive tests (Dreyfus, 2011), physiological tests (Hansen et. al., 2003), hormonal tests (Nesvoldet. al., 2012) etc. Thus, the protocol for data collection needs to be robust and thoroughly verified by past researchers. Everly and Lating (2012) looked at different combinations of tests for recognising stress and the corresponding response to physiological stress. They tested the hormones that are indicators of stress using psycho-physiological stress inducing tests. Their study shows that the response to physiological stress is enhanced by regular exercise (sports and running) and meditation practices (Buddhist mindfulness and Hindu yoga) and combinations of both (such as Tai chi and competitive sporting), and deteriorates with an unhealthy diet, smoking and long periods of psychological stress. Their study uses stressors such as mild physical exercise, neural electrical impulses and cognitive activity. This structure was adopted by Rauch (initially in Rauch et. al., 2011) and a protocol was established (Rauch et. al., 2014). This protocol has been used to collect data during this research.

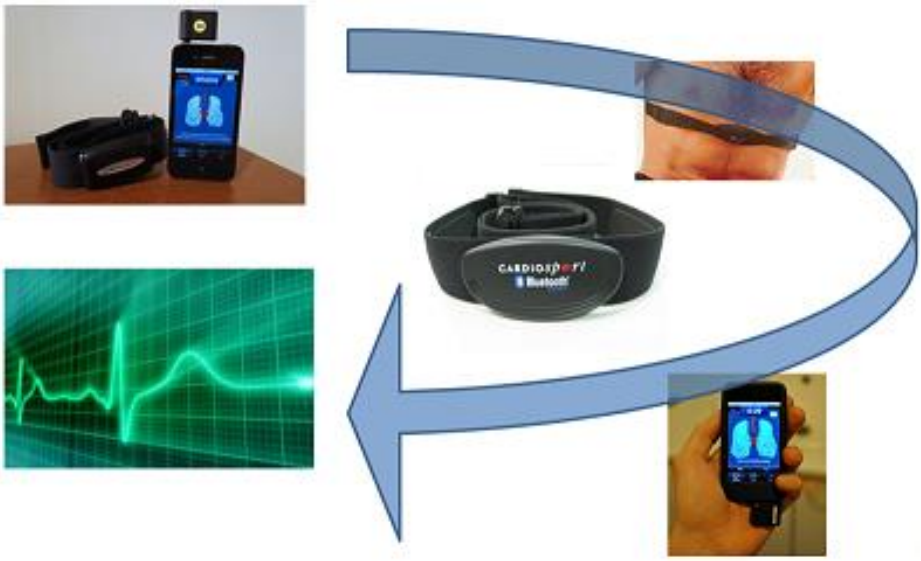
The protocol dictates that data is collected before and after a Stroop test (Rauch et. al., 2011). The Stroop test (explained in literature review section 3.3.2) induces temporary psycho-physiological stress through a short mental game (Renaud and Blondin, 1997). Such stress is consistently created in every trial of the test (Hoshikawa and Yamamoto, 1997). Consistent practice of AbMT interventions increases the ability to deal with the stress and reduce the overall stress level (Jensen et. al., 2012; Everly and Lating, 2012). Therefore, HRV data needs to be collected before and after the Stroop test, to calculate the change in the ability to deal with stress. When such data collection is done weeks apart, it can help to indicate that ability to deal with stress may be a result of practice of AbMT intervention. Usually, it is preferred to gather HRV data multiple times when AbMT practice is undertaken. However, during this research such data gathering would be distracting to the participants during their DfSI project and add to Hawthorne effect. Therefore, data has been collected 7 weeks apart, at the beginning and towards the end of the DfSI project. The analysed information was used during debrief phase to enquire about external factors affecting the physiology during the seven weeks, which include: any non-routine changes in the level of physical exercise, intake of medicine and smoking, along with any perceived stress experienced during the project and any physical or mental trauma suffered during the time data was being collected.

The selection of the device and protocol for HRV data collection was peer reviewed with experts and tested using a pilot-study (see section 4.4). The selected device had to be non-intrusive, non-intimidating and portable. The device needed to provide appropriate information in degree of detail that is appropriate for research. As this research was based in Northumbria University, the research-grade device available to gather Heart Rate (HR) information was Power Lab. This device is bulky and requires wired connections to the human skin, which makes it intrusive as it restricts free movement and can distract participants during their real-world setting for research. For these reasons, alternate wireless technology has been preferred by researchers in sport science (Yanet. al., 2015; Rauch et. al., 2014). Due to the commercial applications of HRV, the market is now flooded with different wireless devices that measure heart rate and even calculate HRV. Such devices utilise a chest strap, earpiece or wristband coupled with wireless transmitters making them portable and non-intrusive. They are called bio-feedback devices because they provide biological data to the user. However, most commercial bio-feedback devices (such as those from Sony and Philips) are inappropriate for research purposes because they do not capture an appropriate level of detail in their data. For example, the frequency of collecting heart rate by a device should be 500 readings per second or more, so that HRV can be calculated from adequately detailed R to R responses. Most portable devices that capture such a level of detailed information are too expensive. Cost was also an essential criterion while selecting an appropriate device. Another criterion for selecting the device is the level of calculations performed by the affiliated software and use of appropriate formulae for such calculations. Most portable devices now-a-days, do not provide the standard R-R interval data from the heart rate captured in the form of an Electro Cardio Graph (ECG[16]). Also, the data needs to be accurately calculated using formulae that are recognized as standard for research, which most software do not use. Based on these criteria, a chest-strap from 'cardio-sport' (with a frequency of 1000 readings per second) and the software 'ithelete' were selected as appropriate tools for data collection. This followed a successful pilot study with 12 participants to verify if the HRV calculated as RMSSD[17] using ithelete was consistent with RMSSD calculated from an ECG collected using PowerLab, which is the accepted standard device for research (see details of the study in section 4.4).

[16]Electrocardiography (*ECG* or EKG) is the process of recording the graphical representation of the electrical activity of the heart over a period of time using electrodes placed on a patient's body.
[17] RMSSD stands for Root Mean Squared of Successive Difference in heart beats.

Data was collected using a chest strap, which has electrodes at the rear side of the belt and a wireless transmitter at the front. These electrodes need to touch the skin and need to be moistened before every data collection (See figure 3.4). For this purpose wet wipes for clinical standard application were used. The participants were introduced to the chest belt during an initial induction session and taught how the chest belt is strapped on. Later, during data collection sessions, the participants could put on the device by themselves in private.

Figure 3.4: HRV data collection (adapted from the ithelete website)



The receiver is attached to a Smartphone, which is installed with the official 'ithelete' software. The software guides the participant to regulate their breathing rate to eight breaths per minute while Heart Rate (HR) information is collected. This is important because breathing affects HRV readings and an inconsistent breathing rate during data collection sessions will influence the data collected. The software calculates HRV as 20ln (RMSSD), which is the standard formula for calculating HRV. The HRV score provided by the software indicates the level of psycho-physiological stress at the moment of the data collection.

HRV is affected by physical exercise, psychological stress, smoking, age, gender, health conditions, diet and intake of stimulants such as coffee, beta blockers etc. The effect of age and gender is nullified because a response to physiological stress is a comparison of the physiological stress coping ability of the same person before and after the practice of more than six weeks of AbMT intervention. The intake of stimulants such as coffee and smoking

was controlled on the day of data collection and the participants did not suffer physical illness and did not consume any medication during the eight weeks when data collection was done. These factors were confirmed with the participants during the debrief session conducted after the post-project interviews.

b. MASS questionnaire:

The Mindful Attention and Awareness Scale or MAAS is a psychological self-evaluation questionnaire (See Appendix 3). It was used to quantify the level of dispositional awareness and mindful attention at that moment toward five aspects: observation of oneself, a description of one's own emotional state, acting with awareness, having a non-judgemental attitude toward oneself & others and a non-reacting attitude, which means being responsive not reactive (Black et. al., 2012). The questions on each of these aspects are strategically mixed with a five point Likert scale[18] to get the most appropriate score on the scale. The scale has been validated for use with college students and community adults through co-relational, quasi-experimental and laboratory studies (Black et. al., 2012; Crane, 2013). Brown & Ryan (2003) proved that MAAS investigates "*a unique quality of consciousness that is related to, and predictive of, a variety of self-regulation and well-being constructs.*" The MAAS questionnaire was used to help triangulate the quantitative findings of physiological stress with the corresponding change in the awareness and attention of an individual. The MAAS questionnaire was answered by participants during data collection session indicated in figure 3.3. The MAAS score was computed as the mean value of the self-assessment scores selected by the participant, to the 15 questions that indicated their mindful attention and dispositional awareness score. A higher score indicates higher dispositional awareness, which is an indicator of a better psychological state. A sample MAAS questionnaire is presented in Appendix 3.

[18]Likert Scale most widely used approach to scaling responses in survey research, such that rating scale can be clearly defined.

3.6.6 The Qualitative data collection

This research required creation of evidence from qualitative research methods using a case study strategy. As discussed in section 2.2.2, this research utilised an interpretation of Schön's (1983) 'Reflective Practitioner' as explained by Valkenburg and Dorst (1998) to understand design led innovation where most professional designers consciously bring innovation through design practice which require skills such as

a) project planning, time management and day-to-day activity management which form an important part of design process management (Lawson, 2006; Burke, 2013; Kerzner, 2013),
b) stakeholder management, which may include funding organizations, governmental agencies, third sector institutions and many other private and public sector organizations and individuals (Lawson, 2006; Sanders and Stappers, 2008; Jégou, Manzini, and Meroni, 2004), and
c) team management, which includes building and maintaining productive co-operative relationships with professionals and experts not only from design but other disciplines as well (Lawson, 2006; Stempfle and Badke-Schaub, 2002; Jégou, Manzini, and Meroni, 2004).

To study team design, Valkenburg and Dorst (1998) used two days of video recording of their participants working within teams. However, such a facility was not possible during this research because the DfSI projects were 8 weeks long and were conducted at various locations. Therefore, data was collected during post-project interviews using the literature shown above to pre-define the themes for investigation in the form of open-ended questions so that comparable information could be generated. One of the drawbacks of a post-project interview method of data collection is that, although it claims to collect facts, rather the data is an interpretation of facts that occurred during teamwork for DfSI projects. However, this research is interested in understanding the effects of AbMT intervention on certain aspects during teamwork which the participants considered important. Thus, this research is focused on the differences and similarities in the perception about teamwork between participants undergoing and not undergoing AbMT intervention. Therefore, the post project interviews have been considered appropriate for this research and its implication on using Valkenburg and Dorst's (1998) explanation of design activities has been addressed when defining qualitative analysis strategy (section 3.7.1).

During the interviews, the open-ended questions were followed by the five whys technique (Keyte and Locher, 2004, p.16) along with the positive reinforcement technique (Peterson and Seligman, 2004). Asking five whys explores detailed reasoning for the reflection on each theme and helps to reach to root cause of an opinion presented by the participant. The positive reinforcement is used to keep the participant engaged and on-track and to engage in a positive reflective session.

The interviews were divided into three sections as shown in table 3.1 below. The sections consist of a series of open-ended questions for enquiry around the theme for investigation. The first section referred to the constitution of the team, which investigated experiences regarding multidisciplinary teamwork being affected by the size of the team and the length of the social innovation project (Stempfle and Badke-Schaub, 2002; Jégou, Manzini, and Meroni, 2004; Lawson, 2006). The second section investigated the effect of external factors (Jégou, Manzini, and Meroni, 2004; Lawson, 2006). For this research, the external factors were; the community of users for whom the social innovation was being carried out, the sponsors who funded the social innovation projects, the stakeholders, such as local government officials, NGOs and schools working within the community, the teachers and project supervisors on the MDI course along with some support staff and peers on the course, working on other projects. The third section investigated project management aspects such as; project planning, time management and the day-to-day execution of the plan and management of the project (Kerzner, 2013; Lawson, 2006).

The semi-structured interviews to collect qualitative data were conducted after completion of the social innovation projects, because the interviews were reflective in nature and one of the goals during this research was not to influence the participants in any way other than the intervention, while they worked as a team on the DfSI project. However, it is recognised that a certain amount of influence and subjectivity is always expected in any qualitative research and can be tackled by defining and peer reviewing robust strategies for data collection and analysis. During this research, importance was given to obtain in-depth information on select themes of investigation about teamwork during the DfSI project and therefore, the questions asked to the participants were focused on the theme for investigation and were as follows:

Table 3.1: The questions for semi-structured interviews

Team Constitution

Q1. How would you say the multi-disciplinary aspect affected your teamwork during the DfSI project and why?

Q2. How would you say the length of the project affected your teamwork during the DfSI project and why?

Q3. How would you say the size of the team affected the teamwork during the DfSI project and why?

External/ Environmental factors

Q4. How would you say the sponsor of the project affected your teamwork during the DfSI project and why?

Q5. How would you say the teachers and supporting staff affected your teamwork during the DfSI project and why?

Q6. How would you say the community members and stakeholders affected your teamwork during the DfSI project and why?

Q7. How would you say the peers outside your team affected your teamwork during the DfSI project and why?

Q8. How would you say the resources (e.g. place, computer, printer etc) affected the teamwork during the DfSI project and why?

Q9. Did any other external factors affect your teamwork during the DfSI project?

Project planning/path

Q10. How would you say the project planning affected your teamwork during the DfSI project and why?

Q11. How would you say the time-keeping and time management affected your teamwork during the DfSI project and why?

Q12. Did any other day-to-day project management aspects affect your teamwork during the DfSI project?

Thus, the data collection process was planned as:

- Quantitative data, collected at the beginning and towards end of the DfSI project using the HRV method (Rauch et. al., 2011) and MAAS questionnaire (Brown and Ryan. 2003) to understand physiological stress and psychological states respectively.
- Qualitative data collected during post-project reflection and the de-brief phase using semi-structured interviews.

3.7 Strategy for Data Analysis

Inductive reasoning was used to review the literature, which proposed that 'AbMT practices can improve teamwork during DfSI projects'. To prove this theory, deductive reasoning was used. Such a theoretical proposition is divided into two key hypotheses based on the objectives of this study:

Objective 4A: To validate that the AbMT intervention is being effectively practiced by participants using quantitative analysis.
Objective 4B: To compare that the teamwork of the DfSI project team with all meditators, to the team with all non-meditators and the team with both meditators and non-meditators, using qualitative analysis.

The strategy adopted for qualitative and quantitative analysis to achieve the above objectives is described below.

3.7.1 Strategy for Quantitative Data Analysis

The objective for quantitative research is:

Objective: To validate that the AbMT intervention is being effectively practiced by participants.
To achieve this objective the following hypothesis was postulated:

Hypothesis: "If HRV score increases, then the participant has meditated effectively". The strategy for analysis of quantitative data to verify the hypothesis requires data processing, data analysis and verification of results.

The data points captured during this research are the HRV scores and the MAAS questionnaire scores. These have been explained in section 3.5.5 sub-sections a and b. In quantitative analysis, it is important to clearly define the goal of the study in the form of a hypothesis based on the sub-objectives to be achieved. Hypotheses are created based on the best assumptions drawn from the review of literature and the variables and/or predictors required to prove or disapprove the hypothesis (Rauch et. al., 2014). The variables are selected in such a way that they are linearly associated, which means they are related to each other and form the basis for verifying the hypothesis. The processing is done to verify the data points are normally distributed (see section 5.2). The relationship between the variables

is calculated using the Pearson's sample correlation coefficient. The p-value is calculated to determine the significance of the calculated correlation (with alpha=0.05) (See section 6.2 for analysis and section 7.2 for discussion). Thus by calculating the p-value, the significance of the results is verified.

The design of the experiment is very important so as to define the correct procedures, form of data and the level of measurement needed to analyse the variables. Defining the analysis process helps further evaluate and build a robust measurement system for information about the variables, so that the hypothesis can be approved or disapproved. Therefore, the hypothesis is presented below along with the information about variables and the level of measurement.

Sub-Objective 1: To validate that the data collection process for quantitative data is robust and working as expected.

Part 1: Validating that the Stroop test (MacLeod, 1991) creates physiological stress in the participants: The HRV scores are recorded before and after a psycho-physiological stress inducing Stroop test. The Stroop test is essentially an interactive cognitive test which forces the participant to concentrate and respond in a time constrained manner (Rauchet. al., 2011). The difference in Heart Rate Variability score collected before and after the Stroop test, shows the physiological response of the participant's body to the external stressor (viz. Stroop test). However, the findings are valid only if the stress inducing Stroop test is implemented appropriately. A rigorous and detailed protocol to apply the Stroop test will help reduce the rate of error. Similarly, keeping the data set low reduces the probability of errors occurring. However, verifying the effect of the Stroop test on the participants is important because it affects the rest of the quantitative analysis.

Variables and Predictor: To prove this sub-objective, the Stroop test is the intervention and values collected before and after the Stroop test are the variables. Thus, the Hypothesis is:

Hypothesis 1: 'if HRV scores after the Stroop test are lower than before the test for all participants then the Stroop test is effective'. The level of measurement is discrete values for both the predictor and dependant variables.

Part 2: Identifying the effect of any stress created by factors other than the Stroop test: It is assumed that physiological stress is created during eight weeks of data collection, due to active participation in the respective co-design projects. Thus comparing the base line HRV readings collected during initial and final stages of the project can be used as a quick

indicator to highlight if the participant's data is significantly different [19]at the final stage of the project. The difference may hold value during the analysis of data, only if the difference is noted early and circumstances for the significant difference are accounted for and recorded correctly. For example, some participants may get stressed due to project work, teamwork and other such circumstances. Also, certain participants may experience stress during the eight weeks of data collection due to personal circumstances outside the scope of this research. Such factors may affect the response to measures of the physiological stress of that participant, significantly more than other participants. The effect of these factors can provide erroneous outcomes during quantitative analysis if the circumstances are not recognized early and are not accounted for during the data collection process. If noted and recorded properly, such outlier data have potential to provide unique insights.

Variables and Predictor: To prove the sub-objective, the 8 week co-design project is considered as an intervention, the HRV values calculated at the beginning of the project and toward the end of the project are variables. Thus, the hypothesis is as follows:

Hypothesis 2: 'if HRV calculated at the end of the project is correlated to the HRV calculated at the beginning of the project for all participants then participants' physiology is affected during 8 weeks of project'. To prove this hypothesis, the level of measurement is discrete values for both the predictor and dependant variables.

Sub-Objective 2: To evaluate the relationship between ability to deal with stress and dispositional awareness of an individual.

After understanding the literature, two hypotheses can be generated. Firstly, the change in physiological stress created by the Stroop test denotes the physiological response to stress (denoted as PSR). Such a response is related to the dispositional awareness of the person calculated using the MAAS scores. Secondly, when the calculated change in the response to physiological stress is positive it denotes that the ability to deal with stress has increased and, such ability to deal with stress is related to corresponding change in the MAAS score. This indicates that psycho-physiological ability increases with the dispositional awareness of participants. Thus, it is assumed that there is a direct correlation between the ability to deal with stress and the perception of an individual.

[19] The Heart rate variability is considered to have changed significantly if the before and after values differ by 5 or more points when circumstances of data collection remain the same (Rauch, 2011).

Variables and Predictor: To prove the sub-objective, a person's ability to deal with stress is equated to the change in response to physiological stress and the change in dispositional awareness. The physiological response to stress (PSR) is the difference of HRV scores measured before and after the Stroop test. The 'change in the response to physiological stress' is the PSR scores measured toward the start compared to those measured toward the end of the project. The 'change in dispositional awareness' is calculated as the difference in MAAS scores gathered toward the start of the project and those gathered toward the end of the project. Thus, the hypotheses are:

Hypothesis 3a: 'if the response to physiological stress calculated from HRV is correlated to the corresponding MAAS scores for all participants, then the ability to deal with stress is related to dispositional awareness'.

Hypothesis 3b: 'if a change in response to physiological stress (difference in PSR) is correlated to the corresponding change in MAAS scores for all the participants then the change in ability to deal with stress is related to changed dispositional awareness'.

Note: To prove these hypotheses the level of measurement is a discrete value.

Sub-Objective 3: To confirm that participants with a better response to physiological stress are Meditators:

Literature indicates that the regular and intentional practice of three-minute 'Breathing space' intervention will effectively increase a participant's response to physiological stress, which is the participant's ability to effectively respond to stress. In the literature review, it was noted that the AD node on the heart regulates the heart rate through the parasympathetic nervous system (Section 2.4.1). Studies have shown that effective meditative practice reinforces the parasympathetic nervous system, which aids in dealing with physiological stress (Rauchet. al., 2011). Thus it is anticipated that an improved response to physiological stress is the marker for participants who meditated regularly, intentionally and therefore, effectively. The number of times the participant accessed the online three-minute guided AbMT intervention session is recorded. However, the intention to meditate is important to create any noticeable change in physiology. Thus, if change is observed in the response to physiological stress, then we can confirm that the participant has meditated effectively. However, it can be contended that the practice of teamwork during DfSI and any other factor which could contribute towards physiological changes would affect all the participants during the eight weeks of data collection irrespective of their choice to practice the AbMT intervention. Using the hypothesis 2 above, it can be identified if working for 8 weeks on the project has affected

the participants. If it is confirmed that factors other than AbMT have affected all the participants simultaneously, then AbMT will be one of the factors affecting the participants. In that case other commonalities between all the participants during the 8 weeks of data collection will be explored. However, if that hypothesis fails, then it is safe to reason that meditators with an increased response to physiological stress are because of the practice of AbMT intervention. This information on meditator and non-meditators can then be fed into qualitative analysis, where the rationale for the comparison of the meditators with the non-meditators will be that while the ability to deal with stress increases for meditators, it decreases or stays the same for non-meditators, and such change physiological differences affect behaviour indirectly.

Variables and Predictor: To prove the sub-objective, the 8 week meditation is considered as the intervention, the response to physiological stress as calculated from corresponding HRV value for Meditators is the predictor and the response to physiological stress as calculated from the corresponding HRV value for Non-Meditators is the dependant variable. Thus, the hypothesis is:

Hypothesis 4: 'if the response to physiological stress for meditators is inversely correlated to the non-meditators, then AbMT was practiced effectively'.

To prove this hypothesis the level of measurement is a discrete value for both the predictor and dependant variable.

Thus, for hypothesis 1 HRV data was collected before and after the Stroop test so that these variables could be used to calculate a response to physiological stress. For the hypothesis 2 HRV and MAAS data were collected during initial and final stages of the project so that correlation between physiological stress and the perception of stress by a person could be established. Finally, the HRV data collection was carried out for all participants at the beginning and toward the end of eight weeks, so that the effect of AbMT intervention on physiology could be seen as a physiological change and meditators and non-meditators could be identified. Thus, every hypothesis created for this study uses two variables, and so bi-variate correlation analysis has been considered as the best analysis method. However, for such an analysis the data collected needs to be normally distributed. Therefore, before analysing the data, it has been processed (see section 5.2).

3.7.2 Strategy for Qualitative Data Analysis

Qualitative data analysis has been extensively studied and widely debated leading to a variety of different approaches and methods in the social sciences and Design literature (Bryman, 2004; Atkinson, 2010; Mason, 2006; Creswell, 2013). Mason (2006, p.54) categorizes these into three key approaches known as literal, interpretive, and reflexive. The literal approach to the analysis of qualitative data is "*the process that focuses on the exact use of a particular language or grammatical structure*." This approach is utilized while using coding with rigid sets of rules for analysing qualitative data. The interpretive approach is concerned with "*making sense of research participants' accounts, so that the researcher is attempting to interpret their meaning*." The reflexive approach attempts to focus attention on the researcher's insights about the data creation and analysis process. Mason (2006) takes a post-positivist approach and suggests that, in practice, many researchers would use a combination of the above approaches. However, this research leans heavily towards an interpretive approach for qualitative analysis.

Data Processing:

Qualitative data collected from post-project semi-structured interviews is transcribed from audio recordings. The transcripts are redacted to ensure anonymity and remove confidential information as described earlier, for example, a name mentioned in the transcript is replaced with the phrase *Name* to let the researcher know that a name was mentioned in that place. Further, if any information is not relevant to the study then that portion of the transcript is struck through. This includes introductory and finishing remarks and the audio recordings from the debrief phase that followed the interviews. Most software based analysis methods require an additional step of removing erroneous data. However, the qualitative analysis process described below is manual and therefore irrelevant data cannot create erroneous results if the researcher applying the process of analysis has clearly defined the goal, but manual analysis requires validation of the analysis process (Creswell, 2013).

Ensuring reliability and Validity of data analysis and findings

Mason (2006) suggested that addressing credibility is important because it increases the reader's confidence. Different ways exist for building credibility such as cooperative enquiry (Heron, 1996), peer review (Godlee and Jefferson, 1999), cross-validation (Osborne, 2008),

audit by expert (Creswell, 2002), triangulation (Yee, 2007) etc. These techniques build the robustness of the data collection and analysis technique that brings credibility.

A good analysis is the one which balances phenomenological descriptions by participants with insightful interpretations from the researcher, and which anchors these interpretations in the participants' accounts (Smith, Flowers and Larkin, 2009). Thus, the process of analysis needs to be thoroughly defined with supporting literature (section 3.2), verified by peer-review (section 4.3) and applied methodically (section 7.2-7.5).

Reliability:

Reliability is achieved by robustly pre-defining the process of analysis, which is rooted in literature and peer reviewed with expert design researchers. To achieve this, case studies are built using thematic analysis by recognising arguments from the data provided by the participants (See section 5.3 for more detailed explanation) and bringing together similar arguments arising in different segments of the data corpus to draw inferences about teamwork during DfSI project.

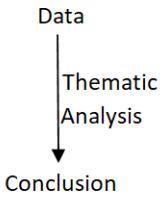


Figure 3.5: Illustration of thematic analysis

As explained earlier, Valkenburg and Dorst's (1998) proposed method is applied to understand the design activities explained through every argument recognised from the data (figure 3.6). Valkenburg and Dorst (1998) used this process of analysis to visualise the 'team-design' as applied by 'design for industry students'. Implication of this is that, unlike industrial design, DfSI projects do not lead to one-off solution to a problem and focus on creating legacy and structure for community to contribute. But this research is not focused on outcomes of DfSI project and looks at limited themes of investigation. Within such themes, Valkenburg and Dorst's (1998) description of design activities provides a structured way to understand team-based design-led social innovation, which is inherently ill-defined and less researched in literature (Dorst and Cross, 2001). Thus, their explanation helps to understand the context of arguments arising from data.

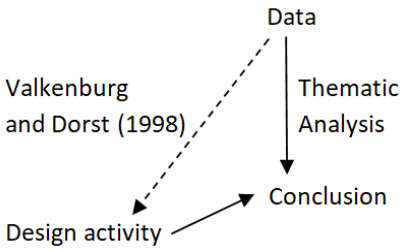


Figure 3.6: Illustration of information on design activity to support findings from thematic analysis

Similarly, the proposed model of inner values presented in table 2.1 utilises inter-disciplinary understanding of inner values to provide an understanding of the inner value-system of the team with regard to different aspects of teamwork during their DfSI project. Applying the model of inner values provides a post-project snapshot and not a real-world day-to-day view. This is because the model attempts to provide an alternate understanding of conclusions drawn from thematic analysis and attempts to contribute to the depth of information rather than the width.

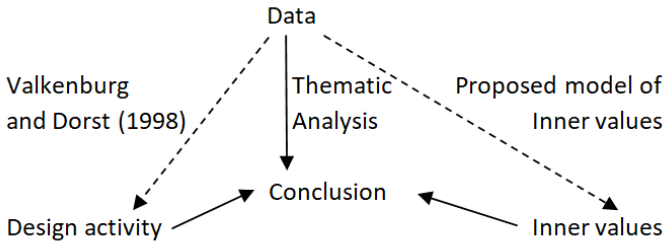


Figure 3.7: Illustration of information on design activity and inner values, to support findings from thematic analysis

Such structured understanding of the process of analysis and its roots in literature brings reliability. However, the process of analysis also requires a review with expert qualitative researchers to achieve much required replicability, as well as a robust understanding of the concepts being applied.

Replicablity:

A replicable process of analysis adds to the reliability of the research. For this purpose, a supporting study was undertaken (see section 4.4) with expert design researchers (tenured research active post-doctoral academics, who are not classified as vulnerable adults)who applied the process of qualitative analysis using an exemplar selected from the data corpus.

Their findings were compared to those of the researcher, to check whether the same or similar observations are made and similar logical inferences can be drawn. This ensures; objectivity, replicability and adds to the robustness of the process of qualitative analysis by improving internal validity defined during this research. The percentage of similarities in the findings is called inter-rater reliability, illustrated in the figure 3.8 below and explained in section 4.3.

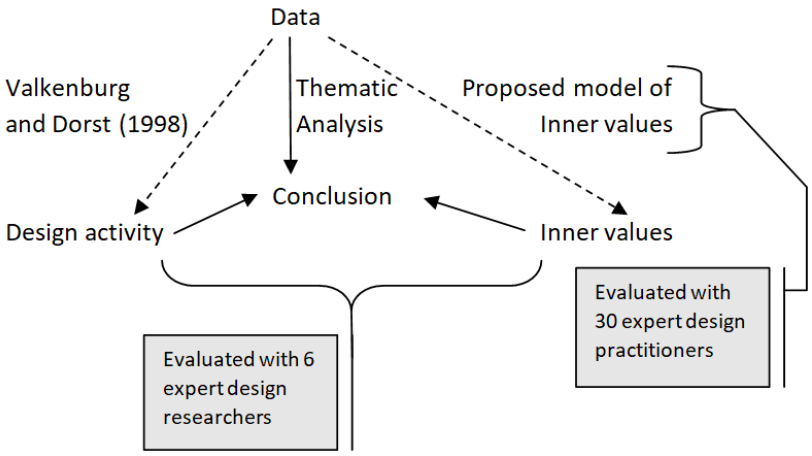


Figure 3.8: Illustration of supporting studies conducted to increase the replicability and robustness of qualitative analysis process.

Robustness:

To build the robust understanding of concepts to be applied during qualitative analysis, this research conducted an evaluation with 30 expert design practitioners who reflected on the inner values and provided their insights. Such in-depth understanding is provided in section 4.2 and used during the qualitative analysis to bring logical reasoning to the application of the proposed model of inner values. Further, robustness is increased by defining the process of qualitative analysis, from coarse-grained to fine-grained, using the following steps from O'Connor and Gibson (2003):

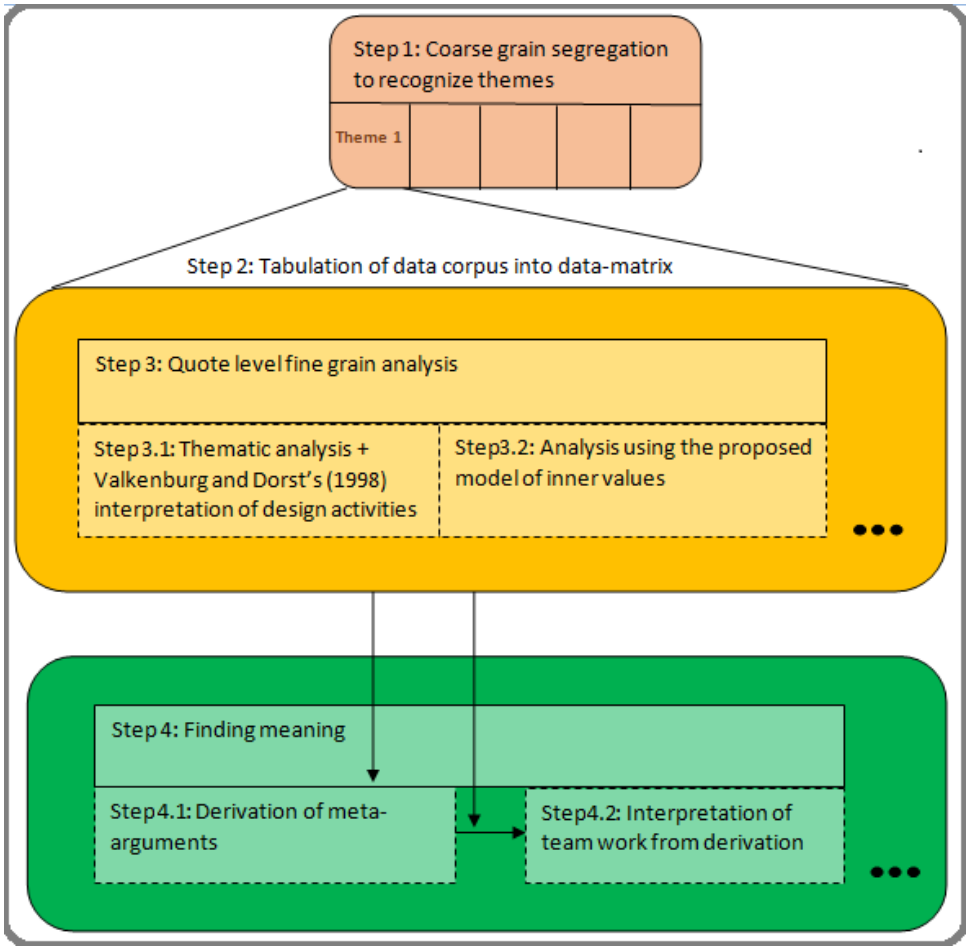


Figure 3.9: Illustration of the process of qualitative analysis (adapted from O'Conner and Gibson, 2003)

Step 1: Recognising emergent themes and organising data accordingly

This step has been correctly explained by Marshall and Rossman (1995, p. 114) "*Identifying salient themes, recurring ideas or language, and patterns of belief that link people and settings together, is the most intellectually challenging phase of the analysis and one that can integrate the entire endeavour*". To assist in this endeavour, semi-structured interview questions for the qualitative data collection were based on the pre-determined themes, as explained earlier. However, it is important to revisit and update the themes based on the actual data. The goal is to recognize emergent themes for coarse-grained segregation of data. It is also important to establish how these emergent themes provide sufficient width of information about teamwork during the DfSI projects. This is achieved by exploring how the themes fit together.

Once the coarse-grained division of data is complete, The data corpus is broken down for thematic analysis into smaller parts called quotes. A quote is a manageable section of the

transcript, which may be as small as a sentence or can be a whole paragraph. A quote has potential to provide an argument, which is the necessary information pertaining to the particular theme of investigation. The quote also provides the context of its meaning in the transcript. It is supported by the time-stamp from the audio recording it is derived from and a quote number is assigned to indicate its place in the transcript.

In the transcript, a quote begins when the participant starts speaking on one of the themes and ends when the participant changes the theme or makes a separate argument pertaining to the same theme. If a quote pertains to a theme not previously determined, then a new emergent theme is noted. If this emergent theme is recurring in other interviews, then it means that the participants consider the theme important and it must be analysed. Similarly, if more than half of the participants (6 participants for this research) do not reflect on any themes, then it means that most of the participants do not consider the theme as an important aspect pertaining to their teamwork during the DfSI projects. By the end of this process, the list of themes is updated by adding any emergent themes and by removing any themes not considered important. All the quotes appearing on a theme are brought together to analyse the views of a participant on that theme. Bigger quotes may be divided into smaller quotes so that they are easy to manage and analyse, based on the different arguments that arise from the quote.

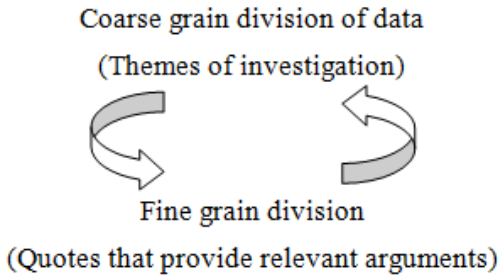


Figure 3.10: Breaking down the data

Step 2: Creating a Data matrix to organise data

When all the transcripts are divided into quotes, the data is coded and organised. The quotes have been coded as follows:

$$Q_{Participant\_number.Quote\_number}$$

The quotes are supported with the time-stamp from the audio recordings so that data can be back-tracked to its source. This organised data-set is stored in the form of data matrices to

segregate the quotes that support and refute effective teamwork as explained by the participant with regard to the specific theme (Section 5.3.2 shows the data matrix for each theme). This provides a systematic approach for deriving arguments from quotes. Further, each data matrix has three subsections for quotes from each of the three teams participating in this research. The subsections are numbered so that findings can be back-tracked to the relevant data-set. The subsections are numbered as:

Subsection$_{\text{Theme\_Number/Team\_Name}}$

Step 3: Making Observation

A quote could have more than one idea, thought, concept or reflection expressed by the participant. This step recognises these reflections on different themes of teamwork during the DfSI project, to understand what argument the participant is making during the reflection, what are the design activities that the participant is reflecting on and what is the inner value-system of the team, based on the way the participant articulates the reflection. There are two sub-steps for achieving this.

Step 3.1: Thematic analysis to recognise arguments made by participants

During this step, an appropriate argument is determined from the quotes. The argument is the rationale used by the participant to build the case/point regarding their teamwork during the DfSI project. The argument is made with regard to the theme recognized in the earlier step. The findings of such arguments in the quotes from every subsection in the data matrix were coded as:

Argument$_{\text{Code\_for\_Subsection-Code\_for\_Quote}}$

Thus, the argument coding provides details necessary to back-track to the relevant data were:

Argument$_{\text{Theme\_Number/Team\_Name-Participant\_number.Quote\_number}}$

To demonstrate this coding, the following quote is used as an example:

> "*It's probably better having people who have radical ideas and solutions to the problem. I mean with same discipline maybe we would have understood each other better and maybe been able to work more efficiently. But I think for the work place in the future, you can't choose who you are working with, it's great sort of practice for that really*" (Q10.1)

The above quote is the first quote arising in the data provided by participant 10 from team A. The thematic analysis can be as follows:

Theme 1- multidisciplinary team structure
Argument 1/A-10.1- The diversity of skills provided a learning opportunity

Note that the argument number above clearly demonstrates theme number followed by team name (1/A), and together this forms a subsection number, which shows the location of the quote in data matrix. A dash separates the section number from the quote number, which is the data where the argument was recognised.

The explanation by Valkenburg and Dorst (1998) helps to recognize the design activities which the participant may be explaining in the quote, namely; naming, framing, moving, reflecting. The protocol for identifying these activities has been explained in section 3.3.1 earlier. Continuing the example quote above, applying Valkenburg and Dorst's four types of design activity explanation can be used to reveal the following detail:

> Activity described by participant may be coded as '*reflecting*', because it directly relates to past activity being used for betterment of future activities of teamwork during the DfSI project. This was on the participant's mind during the project and thus, the quote refers to a reflecting activity.

Step 3.2: Applying the model of inner values

O'Conner and Gibson, (2003) explain that, "*Sometimes we can learn about a person's perceptions, attitudes, and feelings about something simply by noticing the words, sentences and phrases used to express them.*" Thus, the way in which a participant reveals reflections around themes of investigation may reveal important information that can be recognised using phrases within quotes. Similarly, any expression used frequently by interviewees and, which sounds different to what it means, also need to be noted. During the analysis of qualitative data, such phrases within quotes are important because they mark the start of making observations.

Table 2.1 (See section 2.5.1) is the proposed model of inner values. The table utilises phraseology to identify if an inner value can be said to be existing or lacking with regard to specific aspect of the teamwork during DfSI project. The evidence from the quotes in the form of statements or phrases also needs to be noted to provide the rationale for observation regarding the inner values. These recognised inner values need to be in reference to the teamwork during the DfSI project, not a reflection of the participant's behaviour during the reflective post-project data collection interviews. Therefore, a step 4 is necessary to

determine the commonality in perception between different members from the same team and use them to derive logical interpretation of the inner value system of the team.

Step 4: Analysis of inner values of the team

Step 4.1: Combining arguments from the thematic analysis to create meta-arguments

This step binds the common arguments arising from different quotes, from different participants, into meaningful insights, which are called meta-argument during this research. The meta-arguments are used for thematically understanding the circumstances of teamwork during DfSI project as described by the data provided by the participants. Such understanding is further supported with context of the arguments in terms of design activities as defined by Valkenburg and Dorst (1998).

Step 4.2: Combining observations from the model of inner values using meta-arguments

Inner values recognized from each of the quotes by applying the proposed model are brought together in a meaningful way using the meta-argument. For example, if quotes Q1.2 and Q3.6 provide the same argument, then the meta-argument helps to meaningfully combine the inner values observed in these quotes. Face validity of the inner values was verified using supporting study with expert design practitioners (see section 4.2). The understanding arising from such exercise has been used to bring logical explanation to the observations of inner values which were made using the proposed model of inner values in step 3.2. This way, theoretically, the researcher does not select inner values, but lets them emerge from applying the proposed model in step 3.2 and understand their relevance through logic borrowed from experts in step 4b. However, qualitative analysis is always affected by subjective interpretation of the researcher and this is addressed through supportive study (section 4.3). The end result of this step is a snap shot of the model of inner values with regard to a particular aspect of teamwork during DfSI project as understood and experienced by the members of that team.

The four steps of qualitative analysis provide a depth of understanding about the teamwork during the DfSI project with regard to a specific aspect (theme). The details arising from the thematic analysis provide a case for teamwork during DfSI project, the application of Valkenburg and Dorst's (1998) explanation on design activities provides a contextual understanding to the case, and applying the model of inner values provides a snapshot of the inner value system that may have guided teamwork during the DfSI project. The discussion

of such cases has been used in chapter 8 to compare teams with meditators to those with non-meditators and draw conclusions regarding the effect of AbMT intervention.

3.8 Reflections on the Inter-disciplinary Mixed-method

The inter-disciplinary mixed-method design selected for this research requires thorough strategy and planning. Creswell (2013) points out that the researcher involved in mixed-method research needs to have expertise in both qualitative and quantitative research. This was the first challenge during this research. However, a panel of experts have helped the researcher to gain training and also assisted in introducing concepts to the participants during the data collection process. Further, applying such an inter-disciplinary mixed-method has been challenging because of the long period of time invested in building an appropriate research strategy and design for this novel research application. This included getting approval from different ethics panel from multiple faculties within the university, which was a time consuming process. The third challenge during this research was the stringent criteria for selection of participants and the social innovation projects that they would work on as part of a team. This has limited the number of projects and participants that could be used to gather data during this research. The fourth challenge during this research was the small window of time that the mixed-method allows to collect the different types of data. However, the co-operation of participants has aided this research greatly. Finally, deriving appropriate interpretations from the analysis has been a challenge due to the equal importance afforded to both the qualitative and quantitative data. The help from peers and experts has aided in deriving objective, reasonable conclusions from this research. Like any research, the management of time, people and resources had inherent risks but putting proper contingency measures in place has made the research project successful.

3.9 Chapter Summary

This research required a research strategy from more than one disciplinary background. For this reason, both qualitative and quantitative research methods from different disciplines are used. The inter-disciplinary mixed research method helped to create an effective research design strategy. The information on the qualitative and quantitative research strategy is summarised in table 3.2 below.

Table 3.2: The Research design for this Research

Category	**Quantitative Research**	**Qualitative Research**	**Mixed-method research**
Research Strategy	Experimental strategy and Psychological Strategy	Case study strategy	Mixed-method research strategy
Research tools for data collection and analysis	Heart Rate Variability (HRV) and Mindful Attention and Awareness Scale (MAAS) questionnaire	Post project interviews analysed using Thematic analysis along with Valkenburg and Dorst's (1998) explanation of design activities and proposed model of inner values (table 2.1) to build the cases for teamwork during the DfSI projects with regard to themes of investigation.	A predetermined three phased data collection process and a predetermined strategy for analysis of the qualitative and quantitative data.
Role of the researcher	Passive observation	Active enquiry	Active observer-analysing the data for meaning to emerge
Focus of AbMT intervention	Goal oriented focus (analysis of response to physiological stress and dispositional awareness)	Solution oriented intervention (analysis for positive effect of AbMT on teamwork during DfSI project)	Improvement oriented (discussion to understand implications of AbMT intervention on the teamwork during DfSI projects)

Continued on the next page

Potential side effects addressed before collecting data	Hawthorne effect of training on meditative practice and on teamwork during the DfSI project	Priming effect of meditation training and practice on teamwork during DfSI project which is temporary stimulus for behaviour.	Construct validity of the effect of AbMT avoided by studying physiology, psychology and behaviour
Nature of interaction with participants	Controlled interactions with participants to avoid priming effect due to AbMT on teamwork during DfSI and to avoid the Hawthorne effect during observation.		Interaction is through interpretation of data provided by the participants.
Assessment of Participants	At Individual level	At Individual and team levels	At the level of team to compare teamwork
Complexity of Variables	Two variables pre-decided and fixed (HRV and MAAS scores)	Multiple Variables recognised at the start but they can change and evolve during the research. They are identified as themes of investigation and have been used to create open-ended questions for qualitative interview.	HRV and meditative practice for quantitative analysis and Case study of teamwork for qualitative analysis have been used. Thus, the mixed-method has multiple but fixed numbers of variables during analysis.
Data Collection	Semi-Controlled Setting	Interview about complex real-life setting where most learning occurs	Analysis of qualitative and quantitative methods used for the mixed-method
Process of analysis	Fixed process	Flexible revision along the development of the project and validated by review with expert design researchers.	Fixed yet flexible
Nature of Findings	Focus on testing hypothesis (fixed goal)	Involves looking at multiple aspects of teamwork during the DfSI projects and developing an emergent categorization	Attempting to answer the research question which is the aim of the research.

Chapter 4: Supporting Studies

Before any data collection and analysis can be presented, there is a necessity to understand a few pilot studies that have been conducted during the course of this research. The first study presented is a survey used to gather opinion from expert design practitioner on the proposed model of inner values. The second study is the peer review of the process of qualitative analysis which provides inter-rater reliability. The third study presented in this chapter is the usefulness of ithelete chest belt monitor as a research appropriate tool to measure HRV accurately.

4.1 Purpose of chapter

Before any data collection and analysis can be presented, there is a necessity to understand a few studies that have been conducted during the course of this research to support the main research.

The first study presented is a survey used to gather opinions from expert DfSI design practitioners on the face validity of the proposed model of inner values. The model of inner values has been built based on an interpretation of literature and therefore requires validation by expert practitioners within the community. To save time and gather opinions from multiple expert DfSI design practitioners, the survey method was selected and the findings of this study are explained below.

The second study is the peer review of the process of qualitative analysis. The robustness of the process of qualitative analysis is determined by the replicablity of results when expert design researchers apply the same process. This helps in building internal validity of the process of qualitative analysis.

The third study presented in this chapter is the usefulness of the ithelete chest belt monitor as a research tool appropriate to measure HRV accurately. The device specifications provided by the manufacturer fit the criteria set for data collection during this research. However, it is important that a study compares performance and results of ithelte with those from the research-community-approved PowerLab device.

4.2 Study to gather expert opinion on list of Inner values

The goal of this study was to support the main research by providing face validity to the proposed model of inner value. A survey method was selected to collect quantitative and qualitative data from 30 participants, who attended the DRS and NordiCHI conferences in 2016, and were selected because of their professional experience and expertise of working in teams during DfSI projects. In terms of ethical research practices, these participants were above the age of 18 years and are not categorized as vulnerable according to the Mental Capacity Act (2005). The survey was divided into four sections (see Appendix 6). Section A collected basic demographic information about the participants such as their age, experience in the field of teamwork during DfSI and the nature of their experience as either a design

practitioner/design academic or both. This section also enquired about the organization the participants have been affiliated with. Section B was the main survey and consisted of seven questions about the inner values derived from the literature review (section 2.5.1.4). Each question was preceded with a table showing different sources of literature, followed by a short introduction summarised from the tabulated literature. The questions were to be answered by selecting an option from the seven point Likert likelihood scale (Moors, 2008) for an inner value channelling the participant's (or any designer's) decisions and actions, while working in a team during DfSI projects. The participants were provided with some space after every question to give a reason for their choice for the Likert scale. An example of the questions asked to collect the reflection of participant experience is given below:

In your expert opinion, do designers require the inner value of Hopefulness for co-operation as defined above during teamwork in DfSI?

◉ Always true ○ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

Section C was created for the participants to provide additional comments e.g. any additional references they thought this research should consider or any other inner values that should be considered relevant to this research. Finally, Section D provided the list of references. The participants were provided with a Participant Information Sheet, which provided the following information:

- Why the survey was being conducted
- Who were the expected participants
- The rights of participants
- Structure of the survey
- Informed consent

The participants confirmed their informed consent in accordance with ethical research approval. Any incomplete surveys were not considered for analysis.

4.2.1 Process of Analysis:

The survey data was made anonymous and stored securely. The responses to the likelihood of an inner value being useful for teamwork during DfSI were collected along with the reason for such a choice. Quantitative data from the Likert scales was analysed using descriptive statistical methods and has been presented as graphs. Qualitative responses were coded for the purpose of backtracking and review. For example, the response from the third anonymous participant to the role of inner value 1 was coded as P3Q1. The quotes were divided into for and against arguments based on the choice on the Likert likelihood scale. The outcomes of the analysis process are explained below.

4.2.2 Demographic Information

The demographic information of the respondents can be seen in the graph in Figures 4.1 and 4.2 below. It indicates that the study has an equal gender distribution and has used responses from experts across a wide range of design experience. The graph shows that all participants have expertise as design practitioners and some participants (less than 20%) also act as design academics. The participants belonged to a wide range of countries as shown in the table below:

Country	Organization(s)
Belgium	FHNW, Bazel (Switzerland)/Graphic design- Research, Elewijt (Belgium)
Sweden	Interactive Institute
GB	Barnbrook
GB	The Chase
GB	Design Intellect
US	IBM
GB	Central Saint Martins, University of the Arts London
GB	Newcastle University
GB	The Sage
GB	Northumbria University
Sweden	RISE Interactive
Norway	Oslo University
GB	IDEO
Netherlands	Philips design
GB	Prefer not to mention
US	Deisgn Solutions, IBM
Sweden	Malmö University
GB	Accenture, Newcastle
GB	Glasgow school of Art
US	Recreational Equipment, Inc. Co-op
GB	RVI Bradford
Germany	IDEO, Germany
GB	Baltic
GB	Think Public
GB	MindLab
GB	Thinkpublic
GB	JISC
GB	Baltic Centre
France	Doors of Perception, Royal College of Art
Australia-New South Wales	ide group- Atomo diagnostics- Indes- Bill&Mellinda Gates Foundation- Burnet Institute

Figure 4.2: Institutional background and origin of country

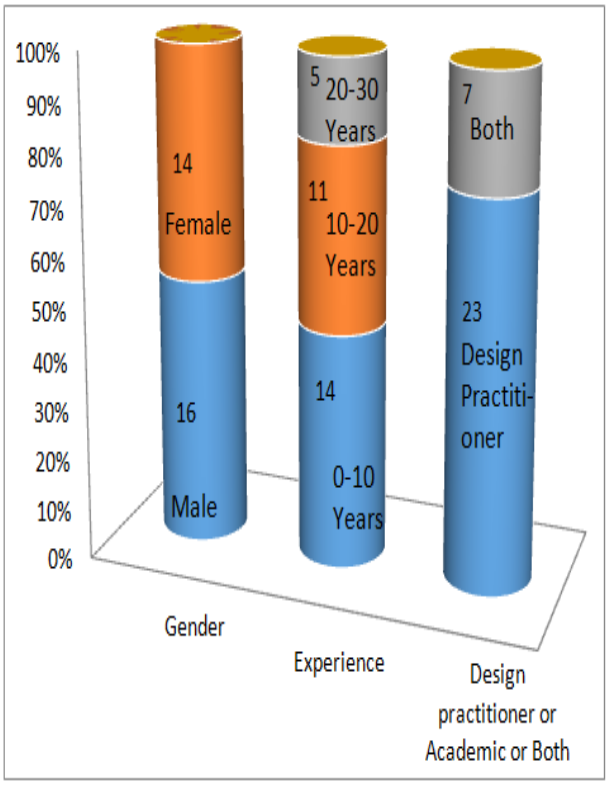


Figure 4.1: Demographic details of participants

4.2.3 Findings from the Quantitative analysis:

The graph below in Figure 4.3 shows the choices of the 30 participants on the likelihood scale during this survey. The shades of green until yellow in the graph show a high likelihood, while orange and shades of red show low likelihood that the particular inner value has been considered useful for teamwork during DfSI by the expert design practitioners.

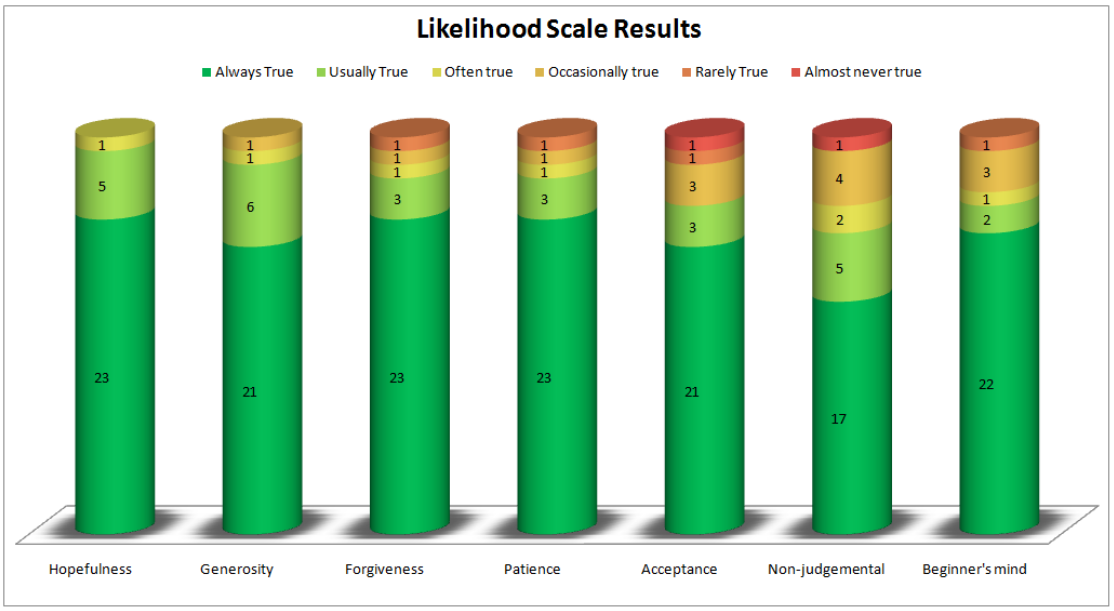


Figure 4.3: Results of likelihood scale from survey

4.2.4 Findings from the Qualitative analysis:

The analysis of the qualitative data was initially conducted by segregating data based on the corresponding choice on the likelihood scale (See figure 4.3). However, it was realised that this way was simplistic and would not do justice to the variety of interpretations of application of inner values provided by the expert design practitioners. Therefore, the data has been segregated to derive themes that recurred in the comments, to bring out these themes as arguments arising from data. Such analysis of data led to more questions than answers, revealing the complexity of judgements that were being made by the experts. These themes arising in the form of questions are presented below. The relevant data is shown only for the first inner value (hopefulness for co-operation) to demonstrate the process of analysis, followed by the other inner values discussed in summary.

Hopefulness for co-operation:

Do designers require hopefulness for teamwork during DfSI projects?

Quote P13Q1 explains the importance of hopefulness at a personal level, "*Working in social innovation as a designer means having hope that you will succeed, that people will work with you and consistent efforts will lead to successful positive change.*" Further, quote P1Q1 explains the importance of hope at the project level, "*Without hopefulness, there is little point in starting anything. Designers always hope that their work will affect the behaviour of people and change things for the better ...*". Quote P8Q1 elaborates why hope is needed, "*In all projects I worked on, the design team and I have remained hopeful. For example, in a social innovation project with the local community we required sensitive information, which could be embarrassing for participants to talk about. The hopefulness for co-operation shows in the approach to the participants and that is what they respond to and open up to.*" In addition, quote P12Q1clarifies how hope works, "*The designers in Social Innovation projects are working with intangible human feelings and having hope shows the stakeholders and participants in a project the confidence of positive change in the future. This attracts positivity from them, which makes the project move forward and complete successfully.*" Quote P29Q1 exploits the creation of hopefulness and explains, "*Hope co-exists with preparedness for things to develop in an unexpected way - so I have said 'often true' rather than 'always true'*". Quote P7Q1 explores the context of teams and clarifies, "*It is important to be hopeful that the rest of the team will contribute in a like-minded way, otherwise there would not be a reason to collaborate with those team members.*" Thus, according to the expert design practitioners who participated in the survey, the inner value of hopefulness for co-operation is essential for teamwork during DfSI to start a project, build relationships with other team members, stakeholders and community members and to create a positive trusting environment during the project.

Can designers remain hopeful throughout the course of teamwork during DfSI projects?

The process of teamwork during DfSI requires the inner value of hopefulness but data shows that maintaining such hope seems to be an issue during real world projects. P5Q1 explains consistent hope is not possible, "*Hopeful designers perform better because their commitment shows. During the course of the* (design) *process there are high and low points for hope.*" The reason for these 'ups and downs' is explained in quote P24Q1: "*In my experience hope is*

important in social innovation projects as the problem and possible solutions are unclear. It could get really messy working through the uncertainty but hope keeps the project going." Thus, the data shows that even though hopefulness is an essential inner value, designers, stakeholders and the community may not always remain hopeful at all times due to uncertain circumstances that may suddenly change during the course of the project.

Who is responsible for remaining hopeful in teamwork during DfSI projects?

The quotes discussed earlier explain the importance of designers remaining hopeful (refer to quotes P1Q1, P5Q1, P12Q1 and P13Q1). The quote P23Q1 reinforces the point, "*Hope keeps designers going through thick and thin. But it is even more essential to a community that the people bringing change remain hopeful, it is equally important to funding organizations, local councils and other stakeholders that the team responsible for change remains hopeful. Hope builds confidence into the efforts of the team.*" Further, quote P3Q1 puts the sole responsibility of being hopeful during DfSI onto the designers, "*To start off, the design team needs to be hopeful but it cannot be expected from other stakeholders and community members you design for. DfSI needs designers to remain strong and hopeful even when morale is lowered by uncooperative situations.*" On the other hand, quote P10Q1 exclaims, "*It* (hopefulness) *is not necessarily a requirement for the designer, but it is for the stakeholders involved.*" The general consensus maintains that the responsibility of remaining hopeful is shared by both designers/design teams as well as stakeholders/community members and quote P4Q1 explains "*Hopefulness is important during social projects to create the enthusiasm about the work. Within design teams the hopefulness is also important, but the community which you work for also needs to be enthusiastic*." The participants differentiated between the hopefulness of designers and the hopefulness of other stakeholders and community members for whom the project works and the data has also raised the question of who is responsible for creating and maintaining hopefulness during DfSI and the answer seems to be that everyone involved shares the responsibility of remaining hopeful.

Generosity of spirit:

Do designers require a spirit of generosity for teamwork during DfSI projects?

Expert design practitioners believe that designers need to take the first step and be generous so as to build trust with stakeholders and community members during DfSI. Designers cannot have the attitude of doing transactions and are required to generously keep contributing even

when such generosity is not returned immediately. Experts believe this is very difficult and a heart-breaking process but essential to gain support. Further, some experts believe that during DfSI, designers act as facilitators or mediators and they need to be generous by giving up the control of the creative outcomes to the community they design with. Even within teams, experts believe that designers need to give importance to the input from other members and stakeholders. Thus, the importance of being generous is summarized by one of the participants: "*desirable social outcomes can seldom be imposed; a spirit of giving is usually a valuable factor*".

Is Generosity easy in teamwork during DfSI projects?

Expert design practitioners seem to believe that it would be good if everyone involved in the DfSI process showed generosity of spirit. However, a spirit of generous behaviour seems to be instigated mostly by the designers while other stakeholders and community members are not expected to do so during the initial stages. Yet many experts agree that reciprocal acts of generosity from the community and stakeholders are rare, making a continuing effort of being generous a difficult endeavour for the designer/design team.

Forgiveness for defection:

Is Forgiveness an important inner value for teamwork during DfSI projects?

Change is hard for a community and yet designers are responsible to create change making forgiveness an important quality for the designers. Expert design practitioners explain how they forgive other team members, stakeholders, community members and even themselves for circumstances arising during DfSI projects. A few expert design practitioners were not comfortable or familiar with the concept of forgiveness in the context of DfSI or they believed forgiveness depended on the situation (e.g. length of the project). However, the larger consensus remains that forgiveness is an essential inner value for teamwork during DfSI projects (quotes P1Q3, P2Q3, P3Q3, P4Q3, P5Q3, P8Q3, P12Q3, P13Q3, P23Q3 for, versus quote P10Q3 and P29Q3 against). Quote P12Q3 best summarizes the finding: "*Designers forgive and move on very quickly. This is what they call; fail early to succeed sooner. Without forgiveness, designers would be stuck at every failure.*"

Who forgives whom in teamwork during DfSI projects?

It is curious that forgiveness from the community or from stakeholders was not mentioned by expert DfSI practitioners who participated in this study. The greater consensus seems to be

that forgiveness is an inner value primarily for the designer as they need to forgive themselves, their own design practice and others involved in DfSI practice, such as, stakeholders or members of the community. Last but not least, designers forgive intended or unintended situations and outcomes arising from the complexity and uncertainty that surrounds the DfSI projects.

Can designers always forgive during teamwork for DfSI projects?

Expert design practitioners seem to believe that designers as professionals gain insights from reflecting on their own design practice and this seems to make self-forgiving difficult. The data shows that forgiving others during the DfSI projects seems to be a comparatively easier task than forgiving one's own choices.

Patience to let events unfold:

Is patience an important inner value for teamwork during DfSI projects?

The data indicates patience is an important inner value for designers during DfSI to work with others and to deal with uncertainty, but it is not always easy, either due to circumstances or because of the nature of design practice being solution oriented. Circumstances require designers to remain patient yet designers may not always have liberty to be patient due to impending deadlines. One of the participants cautions that designers sometime expect quick results rather than a long-term vision and design education needs to address such problems. Yet, most expert design practitioners who participated in this research believe patience is important but remains a judgement call for the designer during DfSI projects.

Who should practice patience and towards whom in teamwork during DfSI projects?

Expert design practitioners seem to agree that designers are expected primarily to keep patience to apply the design process during DfSI projects. Some experts mention that patience is an important inner value for everyone involved in the design process, but designers primarily need to keep patience during DfSI projects while other stakeholders may not remain patient.

Acceptance of a situation:

Is acceptance of a situation an important inner value for teamwork during DfSI projects?

Some expert design practitioners considered acceptance to be important for a variety of reasons while others interpreted the inner value of acceptance differently and considered it to be counter-productive. Acceptance has been considered important for designers, stakeholders and community members with regard to the limitations and boundaries of the project, limitations of people involved in a DfSI project, vagueness of the design process in general, uncertainty of outcomes, and most importantly accepting the complexity of DfSI projects, which may lead to situational mishaps and unavoidable circumstances. On the other hand, a few expert design practitioners described the designer as the person who always seeks a better answer yet they acknowledge that designers accept the responsibility for changing things throughout the project and after the project ends, they accept their process and outcomes to reflect and improve. The experts bring up an important point, that within teamwork for DfSI projects, designers work towards consensus rather than just acceptance and this means sometimes designers do not accept an event and fight to change it. However, a few expert design practitioners have testified that during DfSI projects the designer needs to '*experience an event in a balanced way'* (Kabat Zinn, 2013), a quote from the literature provided during the survey and which the participant summarises as: "*Social innovation with design requires you to accept but also have ability to change things. More importantly it is the wisdom to recognize when to accept and when not to*."

Being Non-judgemental:

Is it important to be non-judgemental for teamwork during DfSI projects?

The quantitative data showed that many participants (25 out of 30) considered being non-judgemental as a useful inner value for teamwork during DfSI projects. However, the reason provided for such choices covered a range of interpretations and usefulness of the inner value. DfSI experts seem to believe that designers primarily require the inner value of being non-judgemental to build 'trust with' and 'empathy for' the stakeholders and the community members. But many expert design practitioners considered making a judgement to be an essential part of design practice and some also believed that not all judgements designers make during DfSI projects may seem rational or instinctive and will require balance between 'rational', 'emotional' or a combination of both. Thus, the data shows that being non-judgemental may be important towards other people involved in DfSI projects but judging and exploiting situations may not be as counter-productive as literature suggests and a necessary step in teamwork during DfSI.

Is it possible to be truly non-judgemental during teamwork for DfSI projects?

Expert design practitioners reflecting on the importance of being non-judgemental while working in teams during DfSI projects voice concern about this inner value. The point brought forward is that design is hardly a rational or structured process and requires designers to rely on being visionary, thinking out of the box, understanding and applying emotions. Designers should facilitate DfSI non-judgementally to include other's contributions and then judge the value of such ideas/opinions to generate interpretations for building solutions. This makes being constantly non-judgemental an abstract idea and to some extent counter-productive during DfSI projects. Further, some DfSI experts spot that being truly non-judgemental is not humanly possible and even if it were, being always non-judgemental would not be beneficial for teamwork during DfSI projects.

Who should be non-judgemental during teamwork for DfSI projects?

According to expert DfSI practitioners, any acts of being non-judgemental need to come from designers when they act as facilitators. Thus, designers may judge situations, ideas and processes but should avoid judging people involved in DfSI projects, which include team members, stakeholders and community members. The literature and data describes judgements as 'after-thoughts' and those judgements contributing to blame are not productive and those contributing positively to the design process are important and remain the responsibility of the designer.

Beginner's Mind:

Is having a beginner's mind an important inner value for teamwork during DfSI projects?

Most of the expert DfSI design practitioners who participated in this research believe having a beginner's mind may be useful during DfSI projects. However, the reasons for their answer reveals that having a beginner's mind may entail a range of abilities. These include having an open-mind to new ideas, observing old things in a new light and creating new things altogether. They explain the difference between learning newly as opposed to unlearning and highlight the importance of experience during DfSI projects. The important question brought out is, "*Yes* (beginner's mind is an important inner value)*, but how to distinguish between 'old knowledge', which is hindering the process and that which can be useful?*"

Who should have a beginner's mind in teamwork during DfSI projects?

Most expert DfSI practitioners during this study put the responsibility of having a Beginner's mind and being creative onto the designers. However, the data shows that designers are trained to keep a beginner's mind and to learn things anew, but in DfSI projects, designers need the community to be able to do the same. A quote from one expert design practitioner summarizes what other experts mentioned: "*Unlearning old habits is an essential pillar to bring change and create social innovation. All our efforts as designers are to facilitate the unlearning process.*"

4.2.5 Other inner values important for teamwork during DfSI:

The expert DfSI design practitioners provided a range of different inner values that may also be important for teamwork during DfSI projects such as: empathy, trustworthiness, trustfulness, enthusiasm, altruism, tolerance, ingenuity, playfulness (ability to enjoy and make things enjoyable), leadership, courage, resourcefulness and being humble. The DfSI experts may or may not consider these inner values more importantly than the ones that you derived from the literature review. But these inner values were not incorporated into this study because they did not surface in the original literature review and therefore, they could not be drawn into the scope of this research, but remain inner values for future research.

Thus, the responses collected from expert design practitioners revealed their reflection on personal experiences of working in teams during DfSI projects. These experts had a very different story compared to the literature and revealed the complexity that surrounds DfSI projects. Therefore, data from this study leads to more questions than answers. Whilst the expert design professionals believe the inner values that are promoted by literature are important to teamwork during DfSI; they also reveal that these values are not necessarily always applicable in every situation. Furthermore, even when they are applicable, it is incredibly challenging and difficult to apply them. It is deduced that the inner values are a situational remedy that assist designers during social innovation projects (DfSI). An expert design practitioner explained inner values as, "tools in the belt of the designer". Thus, designers require the wisdom to recognise the strengths and weaknesses of different inner values and trade-off these inner values during the course of their project, for the benefit of teamwork during DfSI.

4.3 Peer review of the process of Qualitative analysis- A Mini study

In order to estimate the plausibility and transferability of a study, many things are required: a degree of transparency of the collected data about participants in order that they can be seen as appropriate in terms of a range of selection criteria to take part in the study, a clear account of the data collection process, an adequate commentary on the data and key points illustrated by verbatim quotes. The data collection process defined in the research method chapter considered the validity and feasibility. However, the strategy for the qualitative analysis process, which has been clearly defined in the form of steps (explained in section 3.7.2), needs to be validated by the review of expert design researchers. For this purpose, an exemplar was selected from the data and six expert design researchers volunteered to understand and apply the analysis process, and provide their reflections on it. This study is called inter-rater reliability, as it has helped in clearly addressing certain aspects relating to the robustness and replicability of the process of qualitative analysis. The considerations for this study was that the volunteers who participate are expert design researchers (tenured research active post-doc academics with at least five years experience, who are not classified as a vulnerable adult). Appendix 4 presents the document presented to the volunteers to gain their opinions and reflections on the process of qualitative analysis.

Findings from the mini-study

The volunteers applied the process of analysis and showed similarity in selecting arguments and themes from a quote. When applying Valkenburg and Dorst's (1998) explanation of design activities, the volunteers recognised five out of six design activities from the quotes which were recognised by the researcher. The one different observation was pertaining to recognizing 'reflecting activity' where volunteers did not distinguish between reflecting during post project interviews and reflecting during the DfSI project. This was expected because the volunteers were provided limited contextual understanding of data and data collection process due to time constraints. While applying the model of inner values, the volunteers selected nine out of eleven inner values similar to those selected by the research from the same quotes. However, one volunteer pointed out that repeated reading of data would improve researcher's understanding of the content and context. In line with such feedback, the researcher has applied the process of qualitative analysis in four iterations where audio recording was used to understand transcript during first two iterations and third

and fourth iterations focused on finer semantics in the data. Thus, the volunteers provided crucial input which has helped in shaping the way the process of analysis in understood, applied and presented during this thesis. This is explained in the next paragraphs.

One of the volunteers correctly pointed out the nature of the process of analysis. He mentioned, "*This is an interesting approach that allows a number of levels of organisation and coding of content to be undertaken. As it uses a pre-existing definitions of 'activities' and 'inner values' it can be seen to sit within the theory testing rather than theory generating model of research. This is fine, if that is clearly the aim, but if some of the ethos of grounded theory was applied then it would open up the possibility for identifying new activities and/or values and so hold the potential for a greater contribution to knowledge.*" Such views have also been provided by other volunteers. During this research, the theory has been generated using inductive reasoning from the review of literature. Therefore, the purpose of the process of analysis is evaluative, which includes thematic analysis, recognizing design activity as defined by Valkenburg and Dorst (1998) and applying the proposed model of inner values. Though there is rightly much more potential in developing theory from the data, this would not have fallen within the scope of this research, which aimed to evaluate the effect of AbMT practice on teamwork during DfSI projects. This point, highlighted by the volunteer, has been noted in the research method chapter and as a limitation of this research noted in the conclusion chapter.

Another volunteer made the point that, "*As this work involves designers, not always the best verbal and written communicators, is there any recognition/recording of non-verbal communication as a means of expressing the views/attitudes of participants?*" This remains a limitation of this research that non-verbal communication has not been explicitly noted and used for analysis. However, the layering of the analysis process is achieved by defining background of participants (see chapter 5), by performing coarse-grained to finely-grained thematic analysis of the qualitative data, by using robust models rooted in literature to support the understanding of the effect of AbMT on teamwork during design-led social innovation (explained in the research method chapter section 3.7.2) and by comparing researcher's interpretations of the data with that from expert design researchers using this supporting study.

One of the volunteers mentioned that, "*I found that when using your method, most/all responses could be considered reflective with other activities also at play at times, therefore I*

am not sure the value of this activity descriptor, but perhaps other conversations at other points in the process had a different flavour. The inner values were not always easy to define, as there was a general positive note to some comments (e.g. patience) but with a degree of criticism (not patient) so it is difficult to make a clear decision at times, are they recorded twice in your method or is some form of nuance included in one analysis entry?" The volunteer has correctly brought forth an important point that the data has an element of reflective activity as described by Valkenburg and Dorst (1998). This is because the interviews are post-project reflections by participants on their teamwork during their DfSI project. For this reason, the analysis has been modified to look at the description of design activity during the DfSI project, where reflection activity is conducted during the DfSI project, rather than during post-project interviews. Further, the volunteer explains how the data lies within degrees of positive and negative connotation and therefore an inner value cannot be clearly stated to be either existing or non-existing but a combination of both. This is a limitation that has been noted during this research and presented as a possible topic for further research.

Another volunteer explained that step 3a using Valkenburg and Dorst's (1998) interpretation of Schön's Reflective practitioner, stems from the structured practice of design for industry and noted that, "*Design for Social Innovation is not as structured as there are many things happening at the same time*". The volunteer also exclaimed that, "*Even though the model addresses a structured approach from a different form of design, the fact remains that DfSI does not have such a structure in place and* (using) *this model can help understand the process in a more structured way.*" This view was also expressed by two other volunteers. They picked up on an important point made during this research while reviewing literature, which explains that design-led innovation, in all its complexity, cannot be defined as a uniform process because of factors such as the level of expertise of the designer, the level of impact intended by the project, the co-evolving design problem and solution and many others (see section 2.2.2 on exploring design driven innovation). This has also been re-iterated in the research method chapter (section 3.7.2) and again while identifying the limitations of this research. Further, the volunteer highlights the need for some structure to understand the design-led social innovation, which is currently lacking in design literature, a point highlighted in the literature review chapter of this thesis (see section 2.3.2).

All volunteers reflecting on the process of qualitative analysis agreed on two facts that need making explicit during this study. The first is that the research method for qualitative analysis focuses only on certain factors of design by borrowing tools from other disciplines and is not attempting to explain the entire complexity of the design-led social innovation process. This has been explained in the research method chapter of this thesis, which states that this research seeks to develop a depth of understanding about the effects of AbMT intervention on the specific context of teamwork during DfSI (see section 1.5.1 and 1.6.4). Therefore, the priority has not been on the need to understand the broader range of topics that surround design-led social innovation processes and remains a limitation of this research. The second point highlighted about the process of qualitative analysis is that a thorough contextual understanding of the people and their background and circumstances is essential and should be part of the process of analysis. Providing such details, in full, to the volunteers of this supporting study was not possible due to time constraints. However, the background of the participants is explained in the next chapter, along with details regarding the context of the data in terms of the selection of appropriate projects.

4.4 The pilot study to determine the usefulness of ithelete as a research tool

The ithelete used to derive the HRV scores during this research is not a traditional device used for clinical and research purposes. Therefore, a pilot study was conducted prior to data collection to verify the appropriateness of the device. Data was collected using a PowerLab device, which is a recognised device for ECG data collection for research and analysis of HRV. Also, data was collected simultaneously using an ithelete device attached to a smart phone equipped with relevant software. ECG data in PowerLab was collected using electrodes placed strategically around the heart and at the same time the cardio-belt was placed to gather data using the ithelete software (Misczynski et. al., 2004).The data was collected on an average for 13 minutes from 12 participants using the PowerLab device initially in resting mode and then while practicing the AbMT intervention (meditating). Simultaneously, three ithelete readings, each 4 minutes long, were collected. The outcome of the Power Lab is an ECG wave, which was analysed using Kubios HRV software (Rauchet. al., 2014). This is freeware developed by researchers from the University of Eastern Finland to measure and analyse HRV. The results from this analysis is a 10 minute tachogram, which was used to calculate Standard-RR[20], RMSSD, SDNN[21], NN50[22] in the time domain and to calculate the total power and distribution of frequency bands in the frequency domain. Similarly, the average of the three ithelete readings was taken to get the HRV over the same time period. The RMSSD values from PowerLab and from ithelete are shown in the table below.

It can be seen that for Participant 1:

The RMSSD value calculated before meditation using Powerlab = 28.3ms

The simultaneous ithelete score (RMSSD) before meditation = 28ms

The RMSSD value during and just after meditation calculated using PowerLab = 37.1ms

The simultaneous ithelete score (RMSSD) during meditation =37.3 ms.

Thus, the effect of meditation on Participant 1 is clearly seen.

[20] Standard-RR: average of node to node heart beat
[21] SDNN- Standard Deviation of Node to Node data
[22] NN50- The number of pairs of successive NN (R-R) intervals that differ by more than 50 ms

4.4.1 Data from two devices

Table 4.1: Data for Pilot Study to validate ithelete

Participant Number	RMSSD calculated using PowerLab before AbMT	RMSSD calculated using PowerLab after AbMT	RMSSD score from ithelte before AbMT	RMSSD score from ithelte after AbMT
1	28.3	40.0	28	37.3
2	55.3	61.3	55.2	61.5
3	40.2	45.1	40	44.8
4	69.4	86.6	68.9	77.5
5	60.5	70.9	60.5	70.0
6	24.9	31.1	26	29.1
7	33.9	35.0	33.5	35.2
8	25	25.4	25	27.3
9	24.9	29	25	30.0
10	50.1	58.4	50.2	57.2
11	55	60.8	55.5	60.9
12	39.3	43.9	39.5	44.0

4.4.2 Calculations and findings from the study

The comparison of the calculated RMSSD from PowerLab and the RMSSD from ithelte was performed using student's paired sample t-test (Rauchet. al., 2014), to determine if the two sets of data are significantly different from each other. The benefit of using the paired t-test is that smaller samples are required and it measures the difference between two variables, in this case the RMSSD values gathered using two different devices. The formula for the t-test

$$t = \frac{Z}{(s/\sqrt{n})} = \frac{(\bar{X} - \mu)/(\sigma/\sqrt{n})}{(s/\sqrt{n})},$$

where *xbar* is the sample mean, for sample *x* of size *n*, *s* is the ratio of sample standard deviation over population standard deviation (σ) and μ is the population mean. The results from the calculation show that:

	Variable 1	*Variable 2*
Mean	45.59583	45.0875
Variance	294.8126	260.5533
Observations	24	24
Pearson Correlation	0.994298	
P-value	0.0084024	
t Stat	1.212526	
P(T<=t) one-tail	0.11881	
t Critical one-tail	1.713872	
P(T<=t) two-tail	0.237619	
t Critical two-tail	2.068658	

A sample of Kubios HRV analysis is shown in Appendix 5.

lf t Stat < -t Critical two-tail or t Stat > t Critical two-tail, we reject the null hypothesis. This is not the case, -2.069 < 1.213 < 2.069. Therefore, we do not reject the null hypothesis. The observed samples are not significantly different from each other, which is concluded by the significance p-value = 0.008, which is < 0.05 and shows that it can be said with 99% certainty that ithelete is an appropriate device for research as a replacement for the PowerLab device for the given sample set and when data is collected using the given procedures

4.5 Summary

This chapter provided findings from three supporting studies conducted during the course of this research.

1. The first study provides face validity of the proposed model of inner values by gathering qualitative and quantitative inputs from expert design practitioners who have experience in teamwork during DfSI projects. Their opinions reveal that the inner values are much more complex than explained in literature which needs to be considered when applying the model as a research tool. According to the experts, the model may be helpful to organize the explanation of the process and the actions as applied by the design team during DfSI projects.
2. The second study presented in this chapter was conducted to verify the robustness of the process of qualitative analysis applied during this research. Inter-rater reliability has been calculated from the application of the process of analysis on an exemplar by various expert design researchers. The study reveals certain suggestions from the expert design researchers, which have been utilised during this research.
3. The third study presented during this chapter verifies the ithelete device as a research appropriate tool by comparing it to research-community-accepted PowerLab device to collect HRV data. The study shows with more than 99% certainty that the ithelete device provides HRV data similar to PowerLab device.

Chapter 5: Context of Data

This chapter introduces the context for the data that has been collected during this research from members of three teams, who were involved in applying team work during three similar (but not the same) DfSI projects. These teams have been called team A, B and C during this research. This chapter provides context by explaining the details of the criteria for selection of participants, the profiles of the teams formed by these participants, the projects undertaken by these teams and the team work during DfSI projects, to portray the background against which data can be understood.

5.1 Purpose of Chapter

This chapter introduces the context for the data that has been collected during this research from members of three teams who were involved in teamwork during three similar (but not the same) DfSI projects. These teams have been called team A, B and C during this research. This chapter provides context by explaining the details of the criteria for selection of participants, the profiles of the teams formed by these participants, the projects undertaken by these teams and the teamwork during DfSI projects, to describe the context against which data can be understood.

5.2 Profiles of the teams

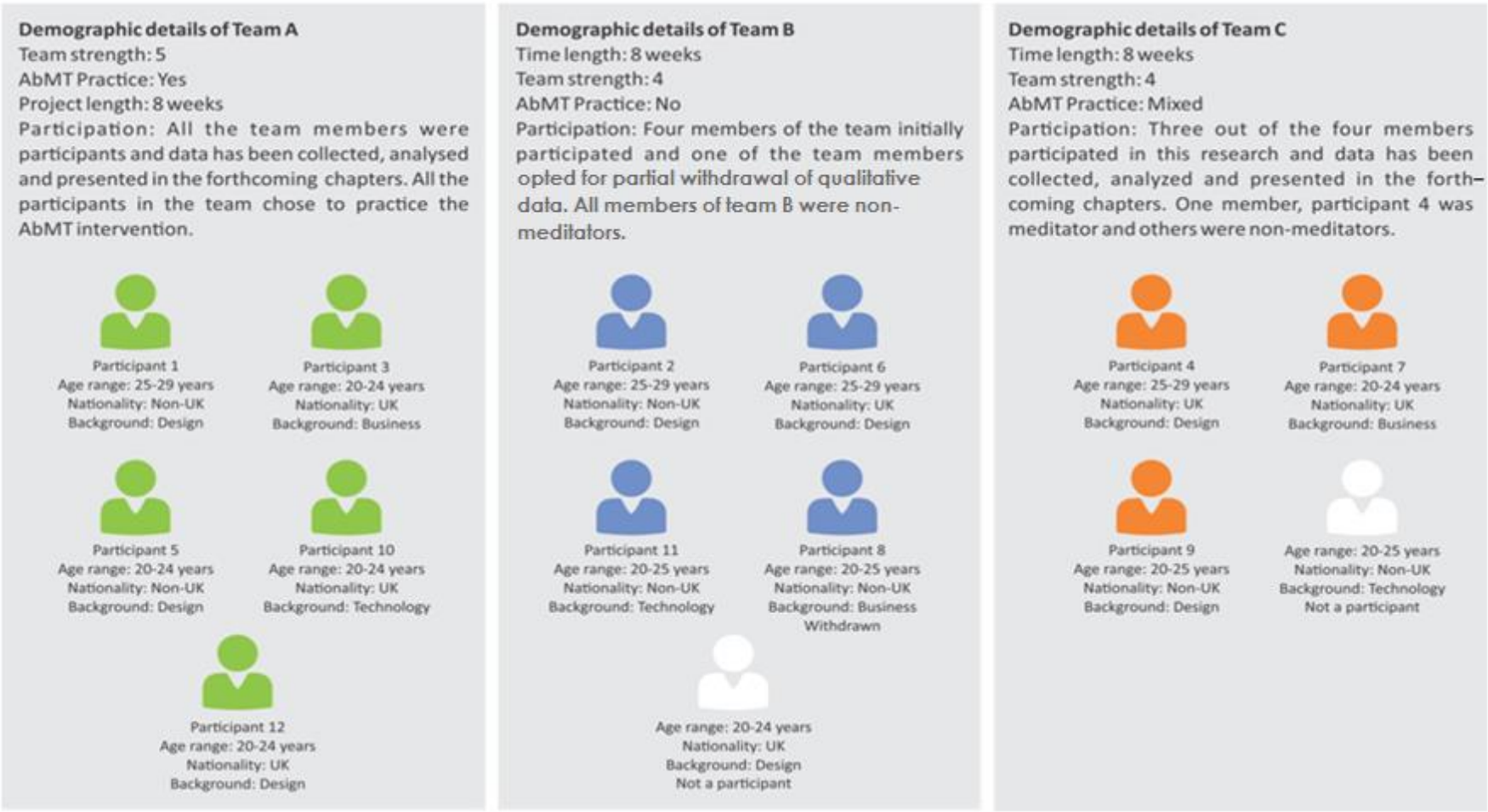
During this research, data was collected from 12 participants to work on three social innovation projects applying teamwork during DfSI projects (See section 3.6 for the method of data collection and section 3.7 for the strategy of analysis). However, before diving into the analysis of the collected data, it is important to understand the selection of appropriate participants and projects that fit the context of this research. Constraints on participant selection were discussed in research method (see section 3.6.4). Therefore, this section explains application of the selection criteria to select appropriate participants and projects. The differences between the selected projects are explained in the subsequent section.

All the participants selected for this study were between 21 and 30 years of age with no known physical or mental conditions and therefore participants could not be classed as vulnerable in any way, either as children below the age of 16/18 years or vulnerable adults with any form of mental disability. The participants had no more than 3 years of professional experience of working in multi-disciplinary environments or of applying teamwork during DfSI projects. Such participants had similar fundamental skills such as being able to communicating in English and a graduate educational background. This was ensured by selecting participants from a pool of students admitted at Northumbria University for the Professional Masters (MA/MSc) Degree program called Multi-disciplinary Design and Innovation (MDI). Further, the participants needed to have similar training and levels of experience, even though their disciplinary skills may vary. Therefore, the participants were trained in the design process for six-months through the MDI taught course work and had applied the design process by working within teams for another six-months. Thus, the experience and expertise of all the participants could be considered as novices (Lawson and

Dorst, 2009) and of a similar calibre to satisfy the selection criteria set out during this research (see section 3.5).

The selected participants had to be divided into multi-disciplinary teams with a complement of four to eight participants to make the team medium sized. The teams needed to have a design focus to engage in teamwork during DfSI projects. For these reasons, the participants were distributed into three teams, each with a member from a graduate degree in; a business discipline, a technical/technological discipline and two or three different types of design disciplines (e.g. product design, interaction design, web design). The teams comprised of four to five members, which makes the size of the team appropriate for this research. The projects were assigned to these participants by their lecturers from the MDI course, to simulate real-world opportunism in terms of subject matter and to systematically make the teams multi-disciplinary as well as multi-cultural and to simulate real-world diversity. Further demographic details are illustrated in figure 5.1.

Figure 5.1: Demographic information of the teams



5.3 Project Details

The social innovation project needed to be longer than 4 weeks to facilitate sufficient practice of AbMT intervention by the participant so that observable physiological change could occur. The projects that the teams worked on also needed to be similar in terms of subject matter and difficulty, so as to facilitate a fair comparison. Team A and Team B worked on two distinct parts of the same project, while Team C worked on a similar social innovation project. Details of the projects setup are explained below. During the projects, the teams were required to create design-led solutions but were not required to develop or deploy ideas into the community.

5.3.1 Teams A and B- Let's Colour activities for Akzonobel project

The project was set in the Ashington community and was sponsored as a part of 'Let's Colour' activities for the Akzonobel project initiated by Dulux (Stevens et. al., 2013). Northumbria University's Multidisciplinary Design and Innovation (MDI, since 2013 the programme has been titled: Multidisciplinary Innovation) students were assigned for this project. Participants were divided into teams A and B during this research and worked simultaneously on this project for 8 weeks. Members of both the teams were multi-national and multi-disciplinary. As seen in the section above, both the teams were made up of five members each; three members from a design background and one member each from engineering and business backgrounds. Both teams had the same time limit and resources. Both the teams were given similar (not the same) tasks to be accomplished during the project. Team A was assigned the task of working with the Ashington community to research and plan 'Let's Colour' events, where Dulux could contribute toward Ashington's community. Team B was assigned the task to work with schools and colleges in Ashington to research and plan 'Let's Colour' events, where Dulux could contribute toward empowerment of the youth from the Ashington community. The two teams were not in competition with each other, nor were they instructed to collaborate with each other. They exchanged a few insights about the community with each other but worked independently during the project. Details of the teamwork during the DfSI project applied by teams A and B are presented in the next section 5.4.1 and 5.4.2 respectively.

5.3.2 Team C- Parking project

Team C worked on a project sponsored by the Department of Parking and Transport for eight weeks and their project has been called the Parking project during this research. The team members were multi-national and multi-disciplinary. The team consisted of four members, two members with a graduate degree in Design disciplines and one in business and one in an engineering discipline. Team C was assigned the task to work with the stakeholders toward providing solutions to improve public perception about the department of Parking and Transportation. Details of the teamwork during the DfSI project are presented in section 5.4.3.

5.4 Description of the Teamwork during the DfSI projects applied by the teams

The selected projects needed to satisfy the definition of social innovation set out during this research (see section 2.3.1). For considering a project to be focused on social innovation, the project needs to fulfil three key requirements; that is, the intention at the beginning of the project is focused on social innovation, the methods applied during the project are focused on creating social innovation and the outcomes of the project are not commercial goals but goals focused on creating change in a person or a group of people. Thus, it is essential to understand if the projects were selected appropriately.

The following section presents an objective view of the teamwork during the DfSI projects as applied by the teams; a summary derived from the researcher's reflective diary and reflections from the designers during post project semi-structured interviews. The images and quotations have been derived from the design briefs used by the teams, the 'Tumblr[23]' and 'Facebook[24]'web-pages created and maintained by the teams during the projects and from the booklets created by the teams as outcomes of their projects. However, it should be noted that this itself is not the collected data.

[23]a microblogging platform and social networking website founded by David Karp in 2007, and owned by Yahoo! since 2013 (https://www.tumblr.com/)

[24] a social networking online service launched in 2004 by Mark Zuckerberg and a public limited corporation since February 2012 (https://www.facebook.com/facebook/info)

5.4.1 Teamwork during the DfSI project applied by Team A

The focus of Team A, as defined by the team members was to "c*reate a modern event that can act as a celebration of the community, incorporating a tradition that revives community heritage using 'colours' with maximum longevity.*"

During the first week team A planned the project stages. The team decided to implement the Design Council 4D process for Design (Design Council, 2005) viz. Discover, Design, Develop and Deploy (shown in figure 5.2). The team decided to keep the first week as a buffer for planning the project where they conducted activities such as organizing themselves and understanding the problem they wanted to solve through the project. The team divided the remaining seven weeks to the tasks allocated based on the 4D process. During the 'Discover' stage, the team decided to conduct activities such as research through internet searches and through a review of literature and also planned on interviewing various stakeholders such as community members, local leaders and community engagement organizations working in Ashington (local businesses and NGOs), which would form part of the collaboration activities of the team during their project. The team allotted two weeks for this stage. For the 'Design' stage, the team selected the tasks of ideation and concept formation through collaboration activities by involving stakeholders and members of community as a part of the teamwork during the DfSI project. Unlike the earlier stage, this was devised to be mostly indoor tasks where lists of possible solutions would be generated. Two weeks were allotted for this task of ideation and concept formation. The 'Develop' stage was given two weeks for post-collaboration activities such as building information and in depth knowledge around the ideas and concepts devised during the collaboration activities so as to check viability of the solutions. Finally, the 'Deploy' stage was allocated one week, dedicated toward the generation of materials such as charts, booklets, etc., to be presented to the sponsors.

Figure 5.2: 4D process for Design

The actual execution of the defined tasks can be described as follows:

During the first week the team came up with a focus for the group by defining expected tasks within a time frame and by defining tools and the resources available. The team analysed individual strengths and weaknesses of the members and of the team as a whole and used this information to allocate individual team members the responsibility of being in-charge for different activities. The team also discussed the problems the project should focus on solving and noted these plans on Post-It notes[25] and put them for display on the wall (shown in figure 5.3 below). The team also created ground rules for conduct within the team (shown in figure 5.3 below). Some team members mentioned during post-project reflective interviews that, they could focus on such planning activities patiently because the AbMT intervention helped them calmly focus on the task at hand to understand their own capabilities required for the DfSI project and not rush into project work. Figure 4.3 presents pictures of the Tumblr blog entry on the code of conduct adopted by team A and the project plan on Post-It notes displayed on walls.

Figure 5.3: The rules set by the team for themselves and the illustrations of the work segregation done in week 1 by team A (left to right)

[25]a small piece of paper with a re-adherable strip of glue on its back, made for temporarily attaching notes

During the second and third weeks, the team was supposed to contact community members and key stakeholders. For this, the team did online research to recognize whom to contact within the community and either physically approached representatives or community members or made appointments via emails and social networking sites (see figure 5.4 below). The team faced a hurdle at this point. Despite several attempts the team could not book appointments with some key stakeholders in a timely manner, which became a cause for concern and stress within the team. During post project interviews a participant described the local community members were distrustful towards the motives of the team. Another participant thought the community members and stakeholders were just too busy to be involved with the project. However, this was just a part of the problems that the team faced.

Figure 5.4: The contact book generated from online research and a picture taken while the team visited the Ashington community in weeks 2 and 3 by team A (left to right)

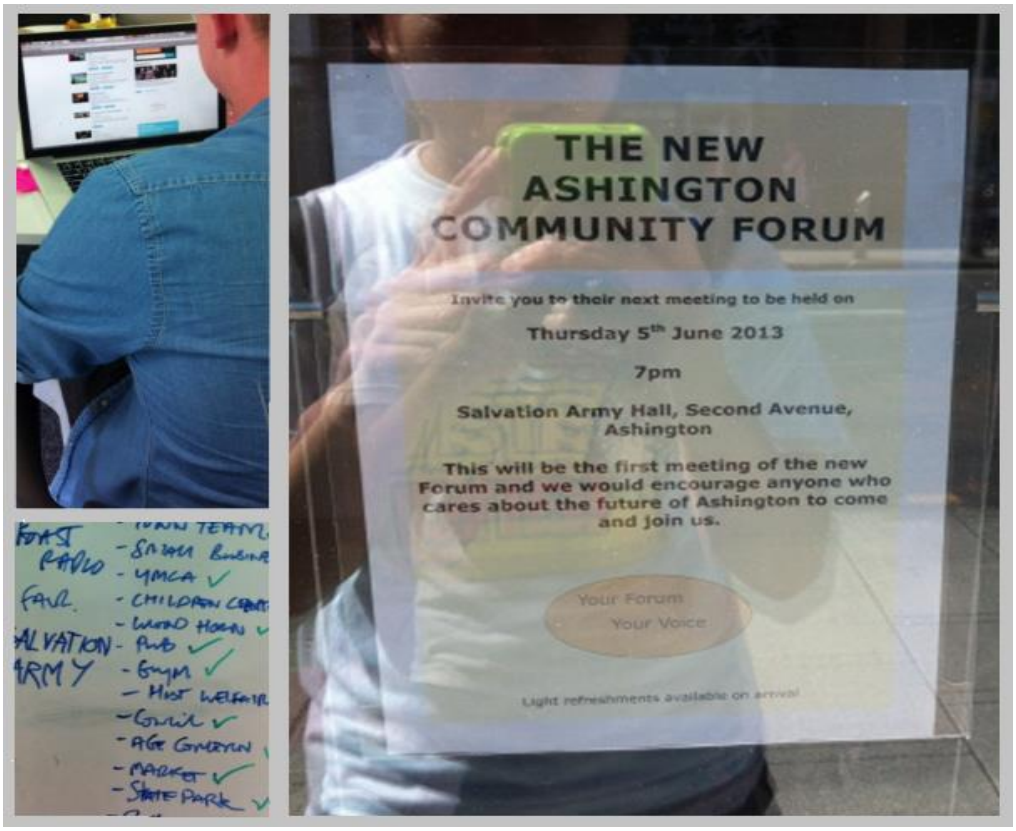
One of the team members explained an incident that took place during the DfSI project. The team tried to establish communication with community members over a social networking platform set up by a local NGO. The questions asked by the team were misunderstood by the stakeholders in the NGO as a lack of confidence in the work the NGO had been doing for the community. This misunderstanding could not be resolved until the team members met the stakeholders in the NGO later during the project. However, during the second and third week of the project, the team felt they were being ignored by both the community members and the stakeholders, which was de-motivating.

Further, the team tried to contact the sponsors of their DfSI project as they wanted to confirm if they had understood the project brief correctly, were progressing as expected by the sponsors and to submit updates of their progress. However, the team could not get in touch with the sponsors. The lack of input from sponsors during this time also added to the uncertainty that the team was facing.

Last but not least, the team members described that the activities conducted within the team during these initial weeks were taking longer time than expected because of the difference in perception between the members from different disciplinary backgrounds. Therefore, the team A had to spend more time and effort to find a common ground and regularly revisit the decisions on what role each member would play for the success of the project.

By the end of the third week, the team decided to continue this discovery phase into the forthcoming weeks. The team members described this phase as very challenging because of the slow progress but all the members mentioned in post project interviews that the practice of AbMT intervention kept them hopeful, patient and persistent during these weeks.

Figure 5.5: (clockwise) Co-design through social networking sites, community meetings and through interviews/workshops maintained as a checklist during weeks 4 and 5 by team A



The team started to get responses from community members and representatives during the fourth and the fifth weeks of the project. The team used these meetings to schedule and conduct co-design activities, which were aimed at recognizing opportunities for social innovation through community engagement in Ashington. The team started such collaborative activities (see figure 5.5 above), where the community members contributed in person and over social networking sites to co-design a number of ideas for recreating popular events where community engagement could take place, as described in their project brief. Following this, the team managed to get appointments with community representatives, which further created a host of opportunities, where social innovation could take place with the help of the local government. Thus, a list of concepts was created for potential events that could be conducted within the Ashington community.

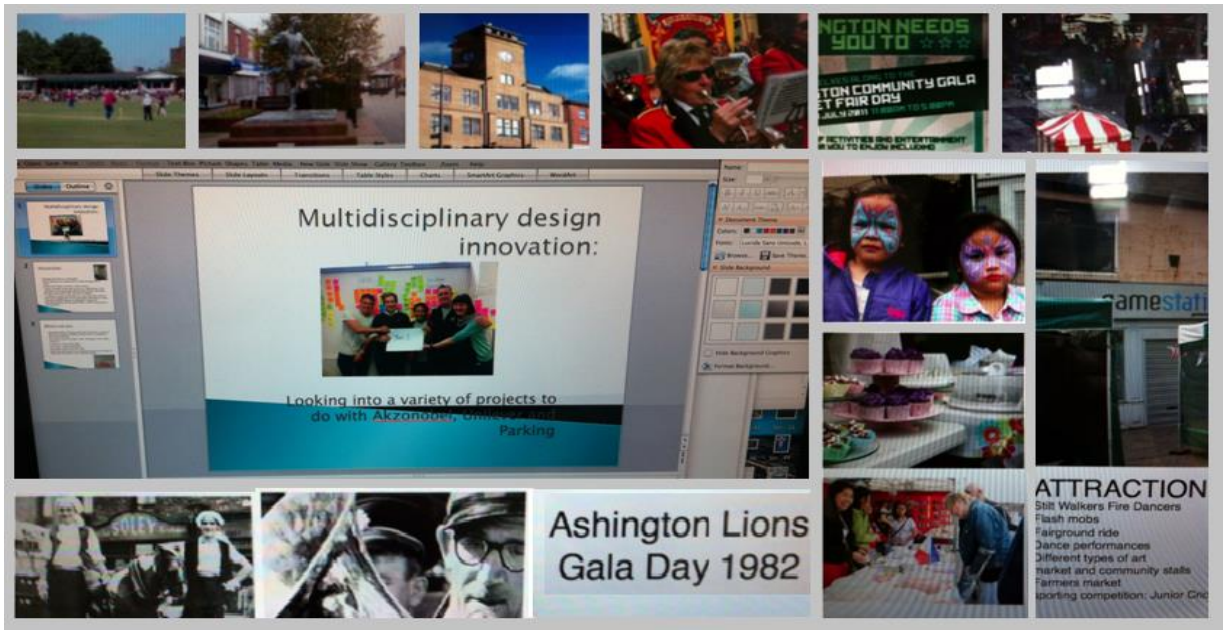
During the fourth and fifth week, certain members faced punctuality issues during team meetings, causing delays. As described by the team members in post-project interviews, the team overcame such issues by re-setting the 'ground rules for conduct within the team' and such changes were proposed and received by the team members with a positive attitude. Some of the members of team A believed that the members in team A could put team benefits above their self-interests because of AbMT intervention. Figure 5.5 above has been adopted from the team's Tumblr blog depicting the collaboration activities as part of teamwork during DfSI projects facilitated by the team during weeks 4 and 5.

During the sixth week, the sponsors were available for a mid-term progress meeting, also referred to as the interim examination. During the meeting the team presented the ideas that the community had co-designed for themselves. The proposed solutions for community engagement were re-structured by the team so that 'Let's Colour' activities could be conducted. Organizing such events required developing public relations, setting brand awareness and generating community involvement with the products that the company has to offer, which the team had begun to crystallize while ideating the solutions with the members and stakeholders of the Ashington community.

The sponsors found most ideas to be useful for community engagement but pointed out that not all the ideas were commercially viable. Initially, the general opinion of all the team members was that the sponsors could have contributed their input sooner, saving the time and efforts that the team had already invested. However, certain team members also took it upon themselves to have considered commercial viability sooner and not to get overly influenced

by the community, rather than waiting for the sponsor to spell it out for them. The team, however, did not spend any more time on discussing past failures and moved on to modifying the co-designed solutions so that the ideas could be made commercially viable while achieving goals that are mutually beneficial to the sponsor and the community. During post-project interviews, certain team members mentioned that the team could let go their own and the sponsor's past failures because they did not want to waste any more time and they believed that the practice of the AbMT intervention helped them look at the situation differently than they usually would and move on to constructive actions quickly. Figure 5.6 shows photographs taken of the slides presented by team A during the interim examination.

Figure 5.6: Presentation by team A to the sponsors in week 6 about possible events that can be conducted in the Ashington community



The team continued the modifications and finalized the list of conceptual solutions in the seventh week. During the eighth week of the project, the team spent time in generating booklets and other outcomes to be submitted to the sponsors and the teachers of the Masters-MDI course. The team created a booklet explaining the ideas for events where Let's Colour activities could be conducted and outlined the process of the idea generation applied by the team. The team also created a presentation and T-shirts with Let's Colour logos printed and hand-outs for the formal presentation to the sponsors. Figure 5.7 below shows some of the pictures taken during weeks 7 and 8 while the team worked tirelessly toward project completion.

Figure 5.7: Modifying ideas and finalising outcomes during week 7 and 8 by team A

The above project was considered appropriate for this research because it satisfies the definition for a social innovation project as described by the literature (See section 2.4.1). This is because, the intent of sponsors was not commercial but social development, the team activities used during the project were focused for such social change and the team created ideas and concepts and initiated building collaboration between Ashington community members and stakeholders such as; local government, local NGOs, local businesses etc. and the sponsoring company for social development.

After selecting the project, members of the team agreed to participate in this research and volunteered to practice the AbMT intervention called three-minute breathing space. All members provided qualitative and quantitative data and therefore, the data from this team can be said to provide a sufficiently complete understanding of the teamwork during their DfSI project. However, it is important to note that because of ethical restrictions, reflections could not be collected from community members and stakeholders who participated in generating the solutions and this remains a limitation of this research.

5.4.2 Teamwork during DfSI projects applied by Team B

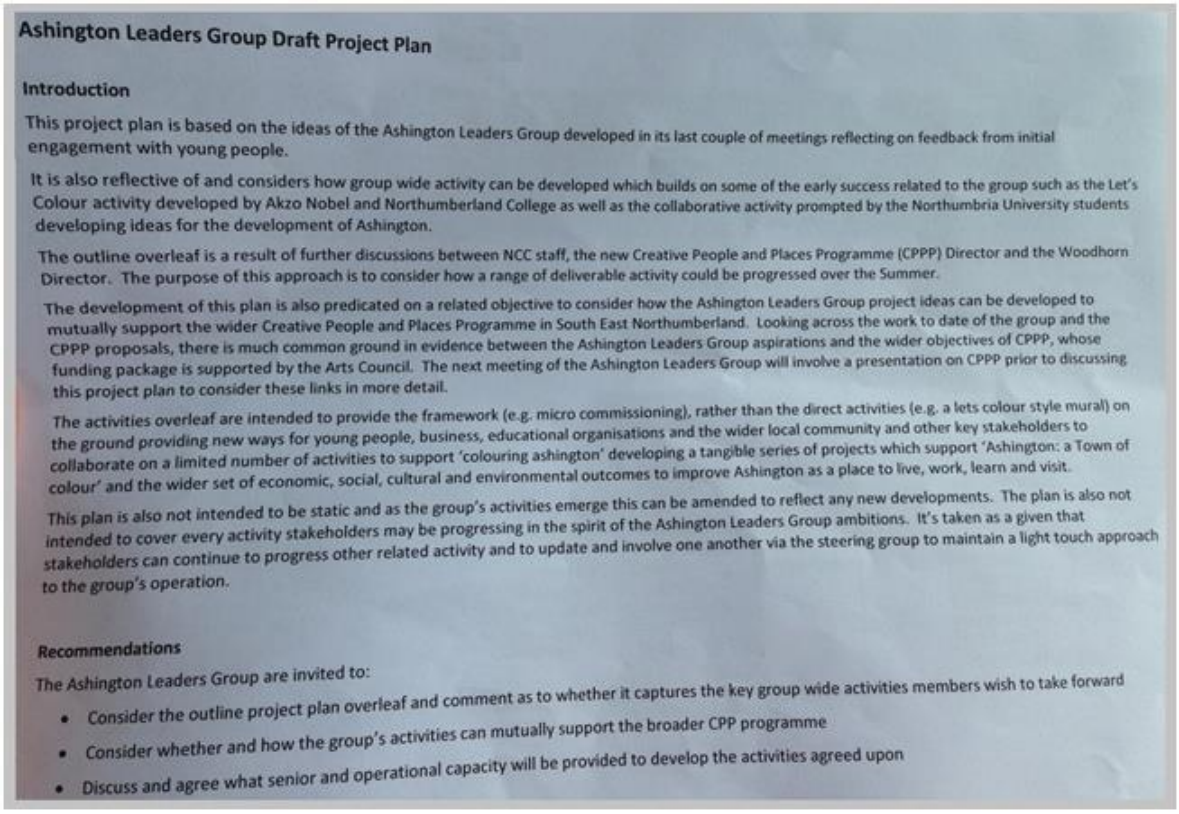
The focus of Team B as defined by the team members was to "*create an opportunity for recognizing and harnessing youth talent using the 'let's colour' platform.*"

During the first week, team B planned the project phases. The booklet generated as an outcome of the project by Team B mentions that team B also implemented the Design Council 4D process for service design. The team had learnt many different ways to implement teamwork during DfSI projects during their course work, so when asked during

post project interviews, the team members explained that this process was adopted by them after discussion with team A during the first week of the project. The team divided the predicted project tasks within the time allotted for the project and divided leadership roles between team members based on the four stages of the 4D process.

During the Discover stage, the team decided to conduct planning activities such as research and arranging interviews with stakeholders in Ashington in order to apply participative methods to collaboratively create solutions with the community members and stakeholders. Yet, on reflection, such planning activities did not include any team building exercises or reflection on the strengths and weaknesses within the team as a matter of importance. The team also decided to share leadership with all the team members during this stage and allotted one week for such planning. For the Design stage, the team allotted a three-week time frame for the ideation and concept formation to create a list of possible solutions with an aim to involve the members and stakeholders within the Ashington community. The team decided that each of the three designers would take up leadership each week during the Design phase. The team allocated the two weeks after this for the Develop phase, when the technical and business people would share leadership each week, to help the team develop ideas into presentable concepts. The team considered this phase to be used to present the ideas to the stakeholders to gather feedback in order to channel further development. Finally, the Deploy stage was given two weeks, dedicated toward generation of materials to be presented to the sponsors. Figure 5.8 below is the photograph of the project plan provided by team B on their Tumblr blog.

Figure 5.8: Project plan for team B



Ashington Leaders Group Draft Project Plan

Introduction

This project plan is based on the ideas of the Ashington Leaders Group developed in its last couple of meetings reflecting on feedback from initial engagement with young people.

It is also reflective of and considers how group wide activity can be developed which builds on some of the early success related to the group such as the Let's Colour activity developed by Akzo Nobel and Northumberland College as well as the collaborative activity prompted by the Northumbria University students developing ideas for the development of Ashington.

The outline overleaf is a result of further discussions between NCC staff, the new Creative People and Places Programme (CPPP) Director and the Woodhorn Director. The purpose of this approach is to consider how a range of deliverable activity could be progressed over the Summer.

The development of this plan is also predicated on a related objective to consider how the Ashington Leaders Group project ideas can be developed to mutually support the wider Creative People and Places Programme in South East Northumberland. Looking across the work to date of the group and the CPPP proposals, there is much common ground in evidence between the Ashington Leaders Group aspirations and the wider objectives of CPPP, whose funding package is supported by the Arts Council. The next meeting of the Ashington Leaders Group will involve a presentation on CPPP prior to discussing this project plan to consider these links in more detail.

The activities overleaf are intended to provide the framework (e.g. micro commissioning), rather than the direct activities (e.g. a lets colour style mural) on the ground providing new ways for young people, business, educational organisations and the wider local community and other key stakeholders to collaborate on a limited number of activities to support 'colouring ashington' developing a tangible series of projects which support 'Ashington: a Town of colour' and the wider set of economic, social, cultural and environmental outcomes to improve Ashington as a place to live, work, learn and visit.

This plan is also not intended to be static and as the group's activities emerge this can be amended to reflect any new developments. The plan is also not intended to cover every activity stakeholders may be progressing in the spirit of the Ashington Leaders Group ambitions. It's taken as a given that stakeholders can continue to progress other related activity and to update and involve one another via the steering group to maintain a light touch approach to the group's operation.

Recommendations

The Ashington Leaders Group are invited to:

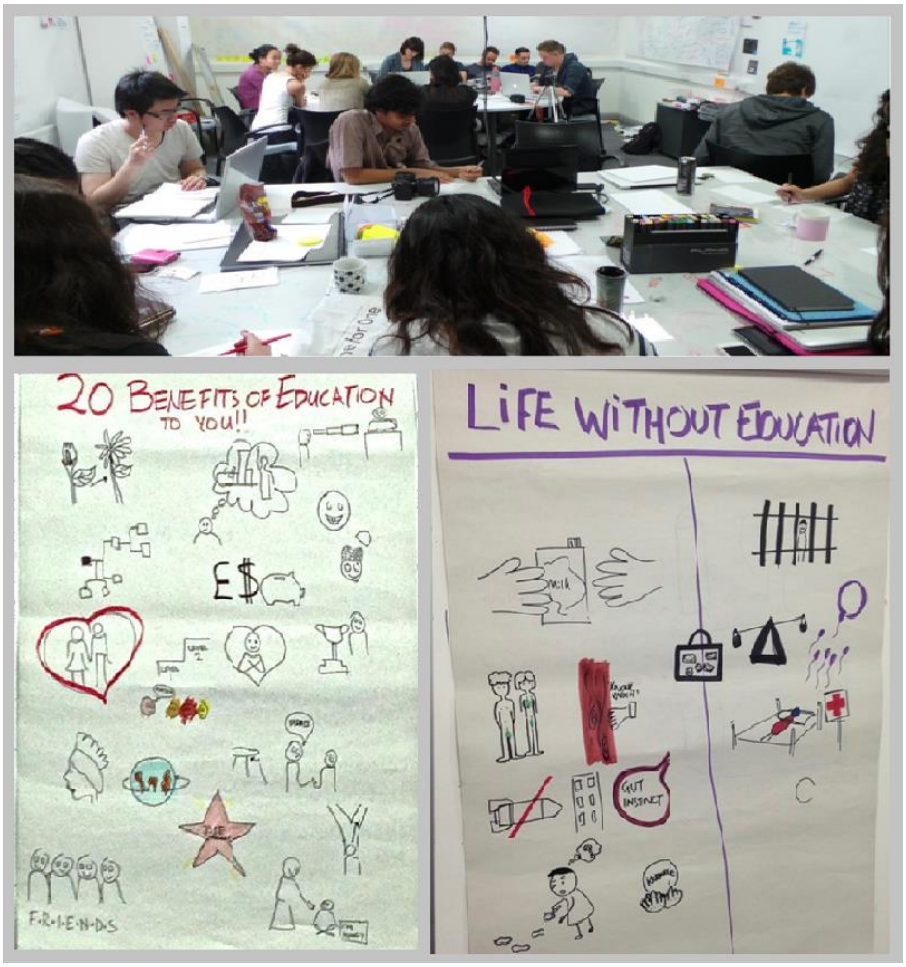
- Consider the outline project plan overleaf and comment as to whether it captures the key group wide activities members wish to take forward
- Consider whether and how the group's activities can mutually support the broader CPP programme
- Discuss and agree what senior and operational capacity will be provided to develop the activities agreed upon

The actual execution of the defined tasks was very different than the team had expected. During the post-project interviews the team members described that the team surpassed the planning stage and did not invest any time in team building activity. Instead, they progressed to online research in the first week. However, the team could not come to a consensus about the problem the project aimed to solve or on what the project outcomes would look like. Thus they could not agree on an approach to involve the members of the community and the stakeholders for co-creating the solutions. Therefore, the team members were reluctant to visit the community because they were themselves unsure[26]. The team finally decided to move to an alternate technique of conducting a brainstorming session with peers. The reason for this brainstorming was to tap into the collective intelligence of their peers from the Masters-MDI course, to understand the project brief and project problem clearly, to build an appropriate interpretation of how the project should proceed and to visualize what the final

[26] A true participative user research process would see the formulation of the questions and setting the brief as a collaborative process from the start, rather than questions to be taken to the community after they had been formed by the student team (see examples in Von Hipple, 2005)

outcomes of the project would look like. Figure 5.9 shows the photographs of the brainstorming session and the outcome of this session visualising the possible solutions that the project might create. The team discussed the outcome of the brainstorming session and had difficulty forming a consensus, which caused further delays and disagreements within the team members. The team realised that such delays were caused due to a lack of leadership as the team was sharing leadership responsibilities across all of its members. The team members decided that to move forward, the leadership should be assigned to one member of the team every week, instead of the policy of shared leadership within the entire team. The team used double the amount of time allotted for this stage.

Figure 5.9: Brainstorming session conducted with peers during week 2 by team B



During the next two weeks, the third and the fourth week of the DfSI project, the team used the ideas from the brainstorming session to generate possible directions for the project to progress. While doing so, the team had a series of debates and there was frequent friction between the team members due to disagreements. The team wanted to create ideas before

visiting the community of Ashington, which would mean they chose not to use a participative approach to their DfSI project. The outcomes of deliberations within the team are shown in Figure 5.10. The internal friction within the team during this stage of the project have been described during post-project interviews by the members of team B as being discouraging and demoralizing.

Figure 5.10: Wall sketching for the possible solutions generated during week 4 by team B

By the fifth week, the team members visited members of the community of Ashington and individually collected views from different community members and stakeholders (local NGO, local school and local businesses). The team quickly realised that they should have visited the community sooner and that deliberations over the past four weeks within the team did not really create solutions appropriate for the DfSI project. This realisation led the team to re-ideate the possible solutions for youth engagement with the input from community members and stakeholders, such as staff at the local schools and at the YMCA in Ashington. Such input provided important direction to the DfSI project, which the internal discussions within the team could not provide. Figure 5.11 below shows photographs of the work done by team B during week 5 of the project.

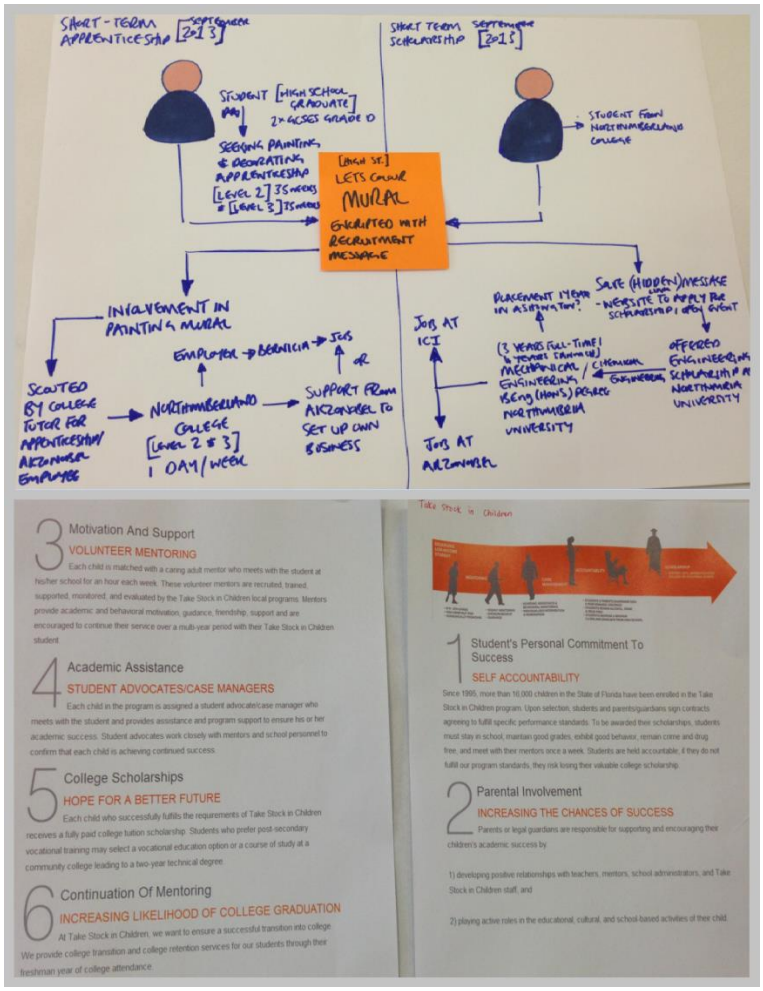
Figure 5.11: (Clockwise) Visit to the school and research conducted on the developed solutions during weeks 5 by team B

By the sixth week the team started to realise that they had wasted a lot of their time. The team members started individually working on making the ideas presentable for the client. However, the team members had different interpretations as to how the solutions should be presented and they had to create and defend the prototype solutions to the other members of their team. This process has been described during post-project reflective interviews as a useful but unnecessarily difficult step during the project and not effective teamwork. According to the members of the team, this activity adversely affected the relationship between the members of the team and created grounds for further conflict. By the end of the sixth week the team presented these solutions to the sponsor of the project during the interim examination.

Until the interim examination, the team had unsuccessfully tried to get in touch with the sponsors to confirm the correct interpretation of the project brief. The members believed that the conflicts within the team arose due to uncertainty toward the direction of the project, which the client should have addressed early into the project. During the interim examination, the team presented the proposed conceptual solutions and prototypes for review by the sponsors. The sponsors provided feedback that the ideas were not thorough enough and the team needed to provide further details on the ideas generated through the DfSI project. The team members seemed to be angry during the interim after receiving the negative feedback. One of the team members kept explaining the ideas for the next half hour to the sponsors to demonstrate the thoroughness of the solutions generated. However, this was not a productive

explanation because the sponsors were not convinced and did not provide any further feedback after this explanation. The post-project interviews with members of team B revealed that the entire team agreed on one thing, the conflicts between members of their team were due to a late response from the sponsors. Another interpretation might be that the team members did not manage to establish a true team effort, never mind the need to do this with the larger community of project stakeholders and users, and blamed the sponsors for it. However, this does not render the participation of team B to have minimal value in this research as a study of AbMT's affect on teamwork during the DfSI project. On the contrary, the participation of team B shines a light on the importance of a team's ability to reflect on their own processes and improve them by letting go prior notions and ideas to work well as a team. Figure 5.12 below shows the photographs of the rough outcomes of the DfSI project by the members of team B, which were later made presentable and offered during the interim examination to the sponsors of the project.

Figure 5.12: (Top) Outcomes of design activity during week 5 and (Bottom) the ideas presented to sponsors (adopted from 'take stock in children') during week 6 by team B



The weeks following the interim examination, the seventh and eighth week of the project, were described as hectic by the team members. After the interim, the team had a clear idea about which outcomes were better suited and where the solutions lacked details. But there was a lot of work to be done and the team did not seem to work together well due to conflicts. Therefore, the team distributed tasks between themselves to be completed by each member individually, so that the project could be successfully completed within the given timeframe. The individual efforts were focused on fortifying the solutions with details. Solutions presented at the end of the project were considered by the sponsors as being up to their expectations. Thus, the team arrived at a solution in terms of a service, which was considered successful by the sponsors and other examiners. However, the team did not work well together and could not create key collaborations with the community members and stakeholder. This may be because community members and stakeholders were involved during late stages of the project and for a very limited time. This is an example why only the ends should not be used as a parameter when assessing the application of teamwork during DfSI projects.

The above project was considered to satisfy the definition for a social innovation project as described by the literature (See section 2.4.1) because; the intent of the sponsors was not commercial but social development. The intended method and the method actually applied by the team, were focused for creating social change and the team created ideas and concepts to build scholarships and youth engagement opportunities for social development of the Ashington youth, with input from the stakeholders such as local schools, local NGOs etc., including the sponsors of the project. The data collected is considered to provide sufficient information about the teamwork during the DfSI project because data was collected from more than half the members of the team (three out of five members).

5.4.3 Teamwork during DfSI projects by Team C

The focus of Team C as defined by the team members was, "*the project has taken a future-focused approach to all things parking. This has enabled the group to create an imagined future in 2020 in terms of the change we would like to see, and generate viable opportunities around this.*"

After reading through the Parking Futures brief the team tried to further define and simplify the brief into three stages:

Stage 1: Review and map all previous MDI Parking works.

Stage 2: Identify concepts for further development.

Stage 3: Take ideas forward to develop realistic concepts.

The team also generated certain ground rules, which all the team members would follow during the first week of the project, see Figure 5.13.

Figure 5.13: The project introduction and the rules set by team C during week 1

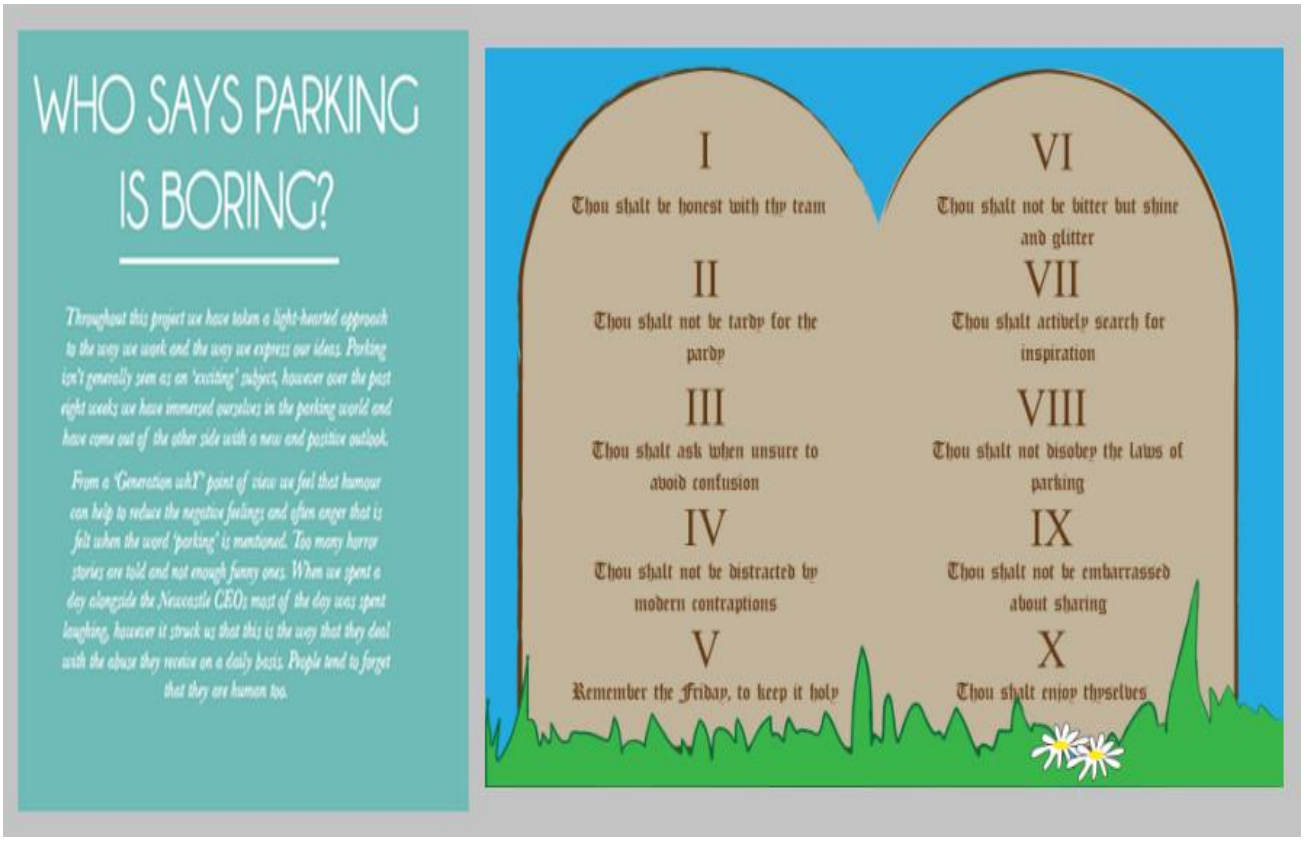
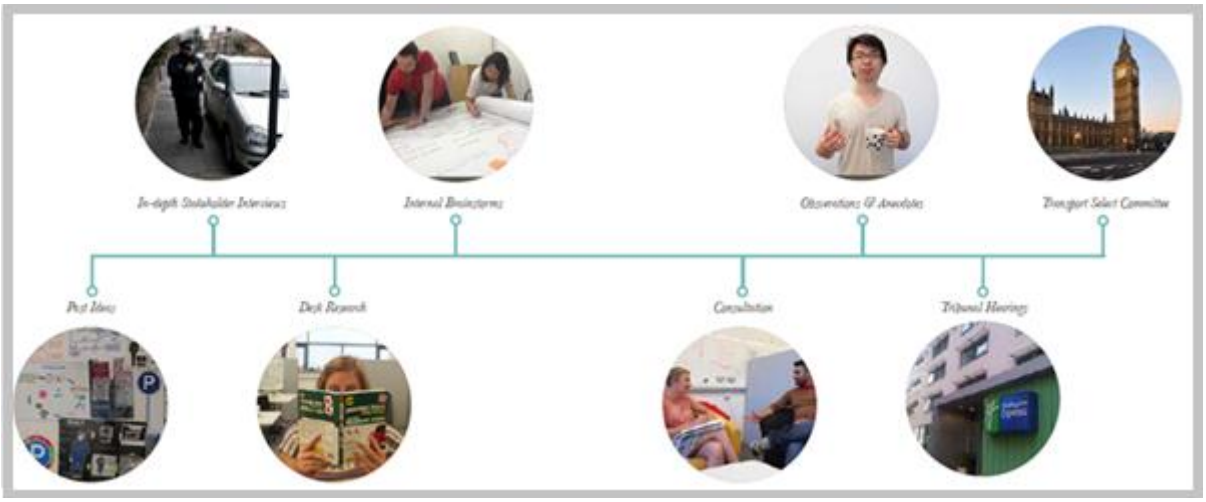


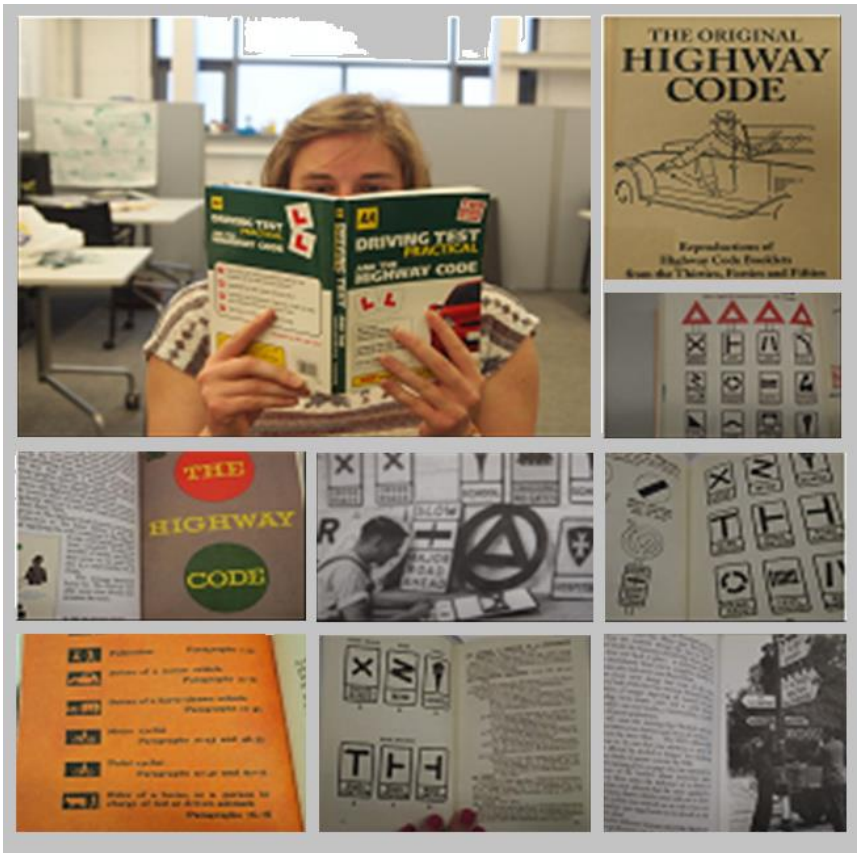
Figure 5.14: The Parking Project Path



(NOTE: In the image above the captions read that, the team looked at *past ideas*, conducted *in-depth stakeholder interviews*, carried out *desk research*, conducted *internal brainstorming sessions*, derived *consultation* from users of parking services, made *observations* from the collected data, consulted the *tribunal court hearings* to verify outcomes and presented the outcomes to the *Transport Select Committee*).

The team allocated eight tasks to be completed in the eight weeks of the project. The team decided that understanding the past projects would be their first step. The research carried out in the past would be explored in the first week and would inform any solutions developed during their DfSI project. In the next two weeks, the team planned to co-design solutions with stakeholders and users within the parking community and support such solutions with desk research (books and online) on Parking and issues pertaining to the public perception of Parking and Transport service department. The team planned to utilise scripts from different inspirational poets, artists, designers and thinkers to inspire the design process and the design team. The fourth week was dedicated by the team to develop and refine ideas generated during the co-design activities. The next two weeks, the team decided to gather feedback on these ideas not only from stakeholders but also from different users of parking services. The final two weeks were dedicated to finalising the ideas, understanding legal and social implications and generating outputs for the sponsors of the project. The actual execution of the defined tasks was as planned by the team. However, the team faced certain interpersonal challenges, which are described below.

Figure 5.15: Research during weeks 1 and 2 by team C



During the first two weeks, the team researched the past MDI projects and their outcomes, and determined the ones considered suitable by the sponsors in the past. This provided insight into which directions have proven suitable in the past and the team discussed the common patterns in successful outcomes and common mistakes in the unsuccessful ones. The team conducted a review of literature on parking services in the U.K. During the post project interviews, the members of team C explained that the interpersonal relationships between members were maintained due to shared leadership and because members provided daily updates in team meetings on the progress they had made individually. The meditating member of the team explained that during these meetings she behaved cordially and was conscious of feelings of the other members due to the changed thought process brought about by the practice of AbMT intervention. Other non-meditating team members reflected that the team meetings were smooth because they were conscious of each other's feelings and when asked the reason for this, they replied that it felt like the correct thing to do.

By the third week, the team members conducted co-design sessions with various stakeholders within the Department of Parking and Transport and collected ideas and insight into what was

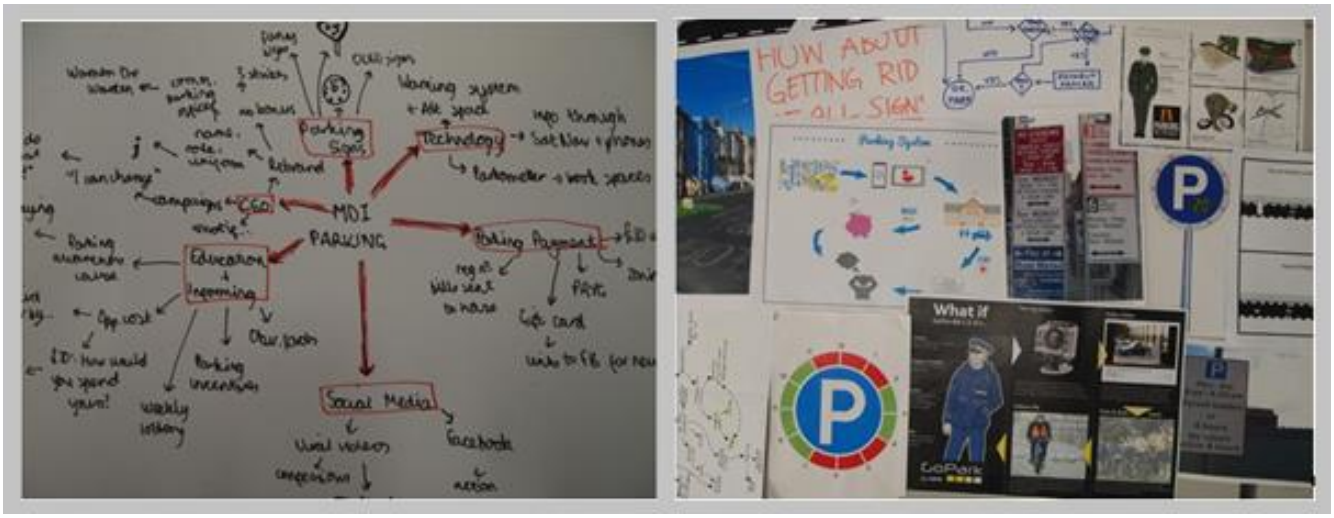
required for the success of the project. Further co-design sessions were conducted with community members and users of parking services through online platforms, who were encouraged to recognize problems and contribute solutions and provide comments on the submitted solutions. Some of the problems recognised during such co-design sessions are shown below in Figure 5.16.

Figure 5.16: Some of the outcomes of the co-design method applied by team C during the DfSI project with users and stakeholders in week 3 led to recognising problems in parking designs, which were difficult to understand.

During the fourth and the fifth weeks of the project, the team had highlighted certain issues which the Department of Parking and Transport faced, and had co-designed solutions with the community of users and the stakeholders. The team started brainstorming to develop ideas into concepts and such interaction led to some disagreements due to creative differences between the two designers within the team. Both the designers had similar skill sets because both were graphic designers. This led to a competitiveness to perform the same tasks during the DfSI project. Such tasks when taken up by one of the designers, and then overtaken by the other designer were perceived as a mistrust in ability. Such misunderstandings caused delays during the DfSI project. However, the team members did not escalate this problem and kept working steadily in spite of these differences. During reflective interviews, the meditator within team C explained that she could let go the competition for betterment of the team as

there were plenty more tasks to do within the project where creativity could be demonstrated. The reason for such an attitude was credited to the practice of AbMT intervention, which helped the member envisage a considered response instead of reacting blindly. Other members of the team reflected that the tension within the team was stressful to them but the team discussed things rationally during the later weeks to sort the problem out and solve any disagreements. This process has been described by the non-meditating team members as exhausting but effective. By the end of the fifth week the team had conceptualised some of the ideas co-designed with the community of users and stakeholders which are shown in Figure 5.17.

Figure 5.17: Conceptualising through brainstorming sessions during week 5 by team C



The team presented the identified problems and generated solutions to the sponsors of the project by the end of the sixth week (see figure 5.18). The sponsors appreciated the outcomes and their feedback was positive. The team members expected critical and challenging feedback from the sponsors and the members were of the opinion that the feedback could include more critiques. However, the team decided to be innovative in interpreting the sponsor's feedback by evaluating the level of enthusiasm shown towards each of the ideas.

During the last two weeks of the project, the team worked together to develop prototypes on the ideas that were considered most suitable for the sponsors. During this time, the disagreements and the misunderstandings from the weeks before were discussed by the team, and the members sorted out the problems between them. While the members with issues expressed their opinions, other members of the team took up the role of mediator,

continuously converting rising confrontations into healthy discussions. Miscommunication between team members was resolved amicably due to such interjections.

Figure 5.18: Prototypes developed during week 7 and 8 by team C

The team was given one extra week to prepare a presentation to the Transport Select Committee and Parking conference held at London by the UK Transport and Safety Department. The team's presentation was widely appreciated and certain outcomes of the project were considered by the department as worthy of implementation by the transport services in the U.K.

The above project was considered to fit the definition for a social innovation project as described by the literature (See section 2.4.1). This is because; the intent of the sponsors was not commercial but social development. Also, the methods used by the team were focused for bringing about social change. Lastly, the team created ideas and concepts to change the perception of the communities of users of the parking and transport services in the U.K., and benefit other stakeholders; such as the Parking and Transport Services Department. The data collected is considered to provide sufficient information about teamwork during the DfSI project applied by team C because data was collected from more than half of the members of the team (three out of four members).

5.5 Summary

This chapter presented the context of the data collected during this research and explains the appropriateness of the selection of participants and projects, based on the constraints set for this research.

The participants of the study satisfied the requirements such as; age, level of expertise and experience of design methods while applying teamwork during DfSI projects (section 4.2). The participants were divided into three teams and worked for eight weeks on three similar, but not the same, DfSI projects. Team A was sponsored by Dulux and worked on an Akzonobel project to develop 'Lets Colour' activities aimed for citizen engagement in the Ashington community (section 4.3.1). The team successfully co-designed detailed concepts for conducting events to build collaboration between the community, the stakeholders and the sponsors of this project (see section 4.4.1). Team B also worked on the Akzonobel project sponsored by Dulux and worked to develop, 'Let's Colour' activities, aimed at youth engagement and development through education in the Ashington community (section 4.3.1). The team successfully developed ideas and concepts for scholarships and other opportunities for youth engagement and mentorship with feedback from stakeholders, community members and sponsors (see section 4.4.2). However, the planned co-designed process did not materialize for team B due to ineffective work as a team. Team C worked on a project sponsored by the Department of Parking and Transportation Services aimed at improving the perception of public services and servicemen for better engagement with citizens (section 4.3.2). The team successfully co-designed prototypes and concepts that the sponsors, stakeholders and communities of users could benefit from (see section 4.4.3). The three projects were considered social innovation projects because they set out with the intent of social innovation, used a methodology for social improvement as well as generated outcomes that were focused on community development and collaboration. The final outcomes were recognised by respective sponsors and examiners of the Masters-MDI course as successful social development project work through design and teamwork.

Thus, the projects selected for the participants to work on, satisfied rigorous constraints for the context of this research, which is teamwork during DfSI projects. It is worth noting that the criteria for selecting appropriate participants for the research meant that they reduced the opportunity and range of suitable projects and participants and that various projects and schemes for projects were rejected, or that circumstances meant that they were not available.

Reflection on the nature of the teamwork during the DfSI projects undertaken during each project has since demonstrated that certain projects fit the description of teamwork during DfSI projects more effectively than others, e.g.: Team A as compared to Team B and team C, which is diagrammatised in the conclusion. Also, the data collected on the teamwork during the DfSI projects was considered sufficiently detailed because more than half the members of each of the teams provided their reflections on the teamwork employed by their team.

Chapter 6: Quantitative Data processing and analysis

This chapter presents the processing of the quantitative data, its context, processing, analysis and findings.

6.1 Purpose of the Chapter

This chapter presents the quantitative data processing strategy, the analysis process of the quantitative data and the results of the analysis process. For quantitative data, the processing is first to normalise the data, analysis is carried out to find Pearson's correlation and the results are derived to verify the proposed hypothesis.

6.2 Quantitative data processing-Purpose and Method:

Processing of quantitative data is important because it gets the sample data into a form necessary for analysis. During this research, data processing has been conducted to confirm that the quantitative data is error free and is normally distributed for statistical analysis (Myers, 2010). Normal distribution is especially important when the quantitative data is a calculated value from a series of data points. For this research, the HRV score has been calculated from a series of Heart Rate data points (R-R interval). Further, the HRV score is in turn used as data points to calculate the physiological stress response. Therefore, it is important to recognise whether the collected HRV data is normally distributed to verify if there are any outliers that skew the data set and could affect the analysis process adversely. Similarly, the MAAS score is another form of quantitative data collected from a series of data points, which are the questions in the MAAS questionnaire and this also needs to be normally distributed. Normal distribution of a data set can be verified using different mathematical tools. One such tool is the goodness of fit test, which has been selected because it provides information on the gap between observed data and expected values. A goodness of fit test, such as the Anderson-Darling (AD) test for normality, is useful in checking whether a given set of sample data is drawn from the given probability distribution (Myerset. al., 2010). If the data is in normal form, then it has been considered ready for analysis. However, if the sample does not fit the probability distribution, it means that the sample has outliers. Recognising the outliers can be done by Grubbs' test for outliers (Myers et. al., 2010), which determines one outlier at a time. Recognising outliers is important because an outlier can either be a useful source of information or can be an erroneous value derived from noisy data. An erroneous outlier can be removed from analysis and the test for goodness of fit can be repeated to verify if the remaining sample data is normally distributed and ready for analysis. This iterative process is best suited for smaller data sets such as the ones being considered in this research.

It should be noted that this method of data processing is not recommended for large sets of data (Myers et. al., 2010). The steps of data processing are explained in detail below:

6.2.1 Step one- Goodness of fit:

The data collected for HRV and MAAS was checked for goodness of fit using the Anderson-Darling test, which is one of the most powerful statistical tools for detecting most departures from normality. The test assumes that there are no parameters to be estimated in the distribution being tested, in which case the test and its set of critical inner values is distribution-free. The Anderson–Darling test assesses whether a sample comes from a specified distribution. Formula for the AD test is:

$$AD = -N - \frac{2i-1}{N}\left(\ln\left(F\left(Y_i\right)\right) + \ln\left(1 - F\left(Y_{N+1-i}\right)\right)\right)$$

Where, *N* is the number of samples, *i* is the sample in question and *ln* is the natural logarithm.

6.2.2 Step two- Recognise outliers:

This step is done when the goodness of fit (p) for step one is lower than 0.05. For this we use Grubbs' test, which is based on the difference of the mean of the sample and the most extreme data considering the standard deviation (Grubbs', 1950, 1969). The test can detect one outlier at a time with different probabilities from a data set with an assumed normal distribution. If the data sample is n>25 then the result is just a coarse approximation but it is perfect as the n<25 for the current data set. The formula to identify outliers is:

$$Gmax = \frac{X_{max} - \bar{X}}{S}$$

$$Gmin = \frac{\bar{X} - X_{min}}{S}$$

Where, *x* is the sample variable and *x bar* is the sample mean and *s* is standard deviation.

6.2.3 Normalization of data

The above steps were applied to process the HRV and MAAS data. HRV data collected for all participants during initial and final stages of the DfSI project was collected before and after the stress inducing Stroop test[27]and it was normally distributed with:

$$p\ value_{\text{pre-stroop HRV}} = 0.11$$

$$p\ value_{\text{post-stroop HRV}} = 0.35$$

As the p value for all the HRV data was more than 0.05, the data was normally distributed. However, the MAAS data was not normally distributed and required the steps that are explained below.

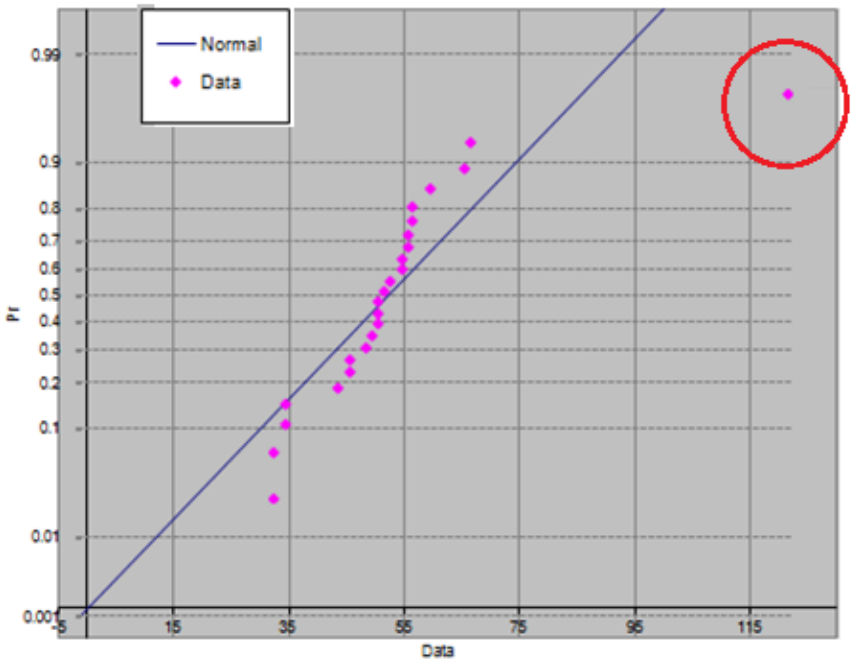
6.2.3.1 First Iteration

The first step is the AD test for MAAS data collected during initial and final stages of the project. It revealed that:

$$p\ value_{\text{MAAS}} = 0.0038$$

The Normal probability plot for MAAS data is as shown in the figure 6.1 below:

Figure 6.1: Normal probability distribution plot for MAAS



[27]The Stroop test creates psycho-physiological stress using a computer game technique. It is a cognitive ability and performance test.

As the p value is not greater than 0.05, the data is not normally distributed and has an outlier. Therefore, step two needs to be undertaken, which is Grubbs' test to identify the outlier. The MAAS data was collected 24 times, 12 times during the initial phase and 12 times during the final phase of the DfSI project. Therefore, n=24:

X_n=121 and X_1=32 (These values may also be indicated as X_{max} and X_{min} respectively)

G_{max}=0.644 and G_{min}=0.061

G_{cirti}=0.413 when p=95% and

G_{ciriti}=0.497 when p=99%

As G_{criti} values are closer to G_{max}, the Grubbs' test is said to indicate that G_{max} is the outlier. This MAAS data belongs to Participant 8.

The reason for the data set to be 'outlier' is investigated next. It can be recognised that the MAAS score collected during initial phase of the project for participant 8 ($MAAS_{8,ini}$=121) is much higher than that of any other participant (mean score = 52.3). Then, is the participant actually different from other participants, or did the participant provide erroneous data?

To answer this, the MAAS score for participant 8 collected during the initial phase of the project ($MAAS_{8,ini}$=121) is compared to the MAAS score collected during the final stages of the project ($MAAS_{8,fin}$=59). The difference in these MAAS scores is very large. Also, in the normal probability plot shown above, we can see that the outlier value ($MAAS_{8,ini}$=121) is at the extreme left corner, far away from the rest of the data. Thus, the chance for the outlier data to be erroneous is higher than participant 8 scoring such a high score. With this evidence, participant 8 was asked the probable reason for providing the outlier data during the debriefing session, which was the third phase of the data collection process. The discussion revealed that, initially, participant 8 had misunderstood the MAAS questionnaire and answered it incorrectly. Thus, the initial MAAS ($MAAS_{ini}$) value needs to be removed from further processing because it is erroneous and therefore non-significant.

6.2.3.2 Second Iteration

Once the outlier value was removed, the remaining data needed to be checked for normal distribution. The AD test revealed that:

p value= 0.5386

As the p value >0.05, the data is now normally distributed and further processing is not required. The MAAS data set is now ready for analysis.

6.2.4 Implications of the processing of quantitative data

The processing of data sets helped in verifying if the data was normally distributed. A normally distributed dataset is essential for applying quantitative analysis methods. The processing of data sets also recognised the erroneous data. Removal of the erroneous MAAS data from the data set impacts further calculations, in one instance when the data is required to calculate change in dispositional awareness (section 6.3.3-3). Change in dispositional awareness is calculated as [$MAAS_{fin}$-$MAAS_{ini}$] and because the $MAAS_{ini}$ value has to be discarded, subsequent $MAAS_{fin}$ cannot be used to calculate change in dispositional awareness. However, after removal of erroneous data, the processed data sets can now be utilised to verify the hypotheses created for the quantitative analysis. Thus, the implication of removal of erroneous data is minimal and the benefits of the removal of the erroneous data clearly outweigh the implications on the process of quantitative analysis.

6.3 Quantitative Data Analysis- Method and Calculations

As discussed in section 3.6.5, every hypothesis generated for quantitative research has two variables. A linear comparison of the two variables can be undertaken because the data is normally distributed (as seen in section 6.2). Pearson's Correlation coefficient is the measure of linear correlation between two variables when data is normally distributed. The calculation of Pearson's coefficient provides a value between +1 and -1 where the number indicates the measure of degree of linear dependence between the two variables and the sign indicates positive or negative correlation.

6.3.1 Calculating Pearson's Coefficient

Pearson's correlation coefficient is represented by r and is calculated by the formula:

$$r = \frac{\sum_i (x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_i (x_i - \overline{x})^2} \sqrt{\sum_i (y_i - \overline{y})^2}}$$

where *x* and *y* are the variables and *xbar* and *ybar* are sample mean values with a sample size i. The corresponding p-value calculated denotes the significance of the Pearson's coefficient. For the calculations, MS Excel has been used with the add-on toolkit called *Data analysis tool* for financial and scientific data analysis (www.support.office.com/).

6.3.2 Interpreting the result

The interpretation of Pearson's coefficient has been standardised as:

"*If Pearson's co-efficient r =*

+.70 or higher	*Very strong positive relationship exists between variables*
+.40 to +.69	*Strong positive relationship exists between variables*
+.30 to +.39	*Moderate positive relationship exists between variables*
+.20 to +.29	*Weak positive relationship exists between variables*
+.01 to +.19	*No or negligible relationship exists between variables*
-.01 to -.19	*No or negligible relationship exists between variables*
-.20 to -.29	*Weak negative relationship exists between variables*
-.30 to -.39	*Moderate negative relationship exists between variables*
-.40 to -.69	*Strong negative relationship exists between variables*
-.70 or higher	*Very strong negative relationship exists between variables*" (Katz, 2006)

6.3.3 Calculations and corresponding results

Based on Pearson's correlation the analysis of the hypothesis is as follows:

1. To validate the data collection process using a stress inducing Stroop test, the hypothesis generated was "*the HRV score after the Stroop test is lower than before the Stroop test for all participants*." The variables for Pearson's coefficient analysis are the HRV scores collected before the Stroop test (number of data points n=24 values= 12 during the initial phase + 12 during the final phase of the DfSI projects) and the HRV scores collected after the Stroop test (n=24 values; Degree of freedom df= [n-2] =22)

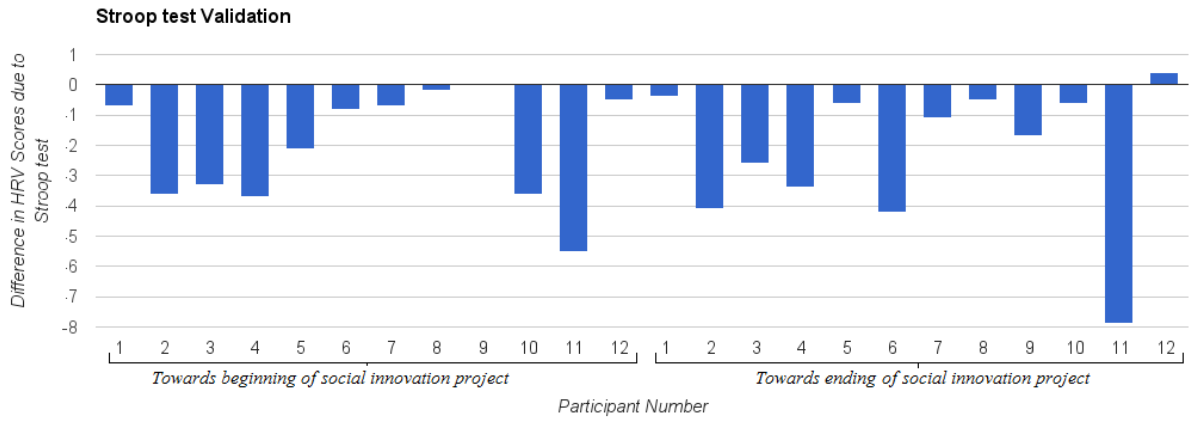
Session name	Participant Number	Pre Stroop RMSSD (ms)	Post Stroop RMSSD (ms)
Towards the start of the project	1	46.4	45.7
	2	43.9	40.3
	3	43.5	40.2
	4	53.8	50.1
	5	47.9	45.8
	6	40.9	40.1
	7	53.6	52.9
	8	46.6	46.4
	9	39.3	39.3
	10	56.2	52.6
	11	46.7	41.2
	12	57	56.5
Towards the end of the project	1	47.8	47.4
	2	49.6	43.7

	3	42.9	40.3
	4	56	52.6
	5	38.8	38.2
	6	39.5	35.3
	7	48.3	47.2
	8	48.6	48.1
	9	38.6	36.9
	10	43.9	43.3
	11	54.5	46.6
	12	50.2	50.6

The Pearson's coefficient is r(22)=+0.936 with a significance calculated as p-value<0.001

The Pearson coefficient indicates that there is a strong positive relationship between the variables. The p-value indicates the significance of the calculated correlation, which is more than 99%. The hypothesis was that HRV after the Stroop test was lower than the HRV score before the Stroop test and the hypothesis is verified with a very strong positive correlation with an accuracy of more than 99% in the collected data set. The finding means that the Stroop test worked consistently on the participants and successfully created physiological stress that can be used for calculating a physiological stress response. The graphical representation below shows that participant's HRV consistently dropped after the stress inducing Stroop test after four or more practice sessions each week of AbMT intervention for more than six weeks.

Figure 6.2: All the HRV scores for participants for Stroop test Validation



Participant 12 was an exception, his HRV score did not drop but rose after the Stroop test. To detect the reason for the anomaly, the data was collected twice and an average of values has

been used to eliminate any technical error. Furthermore, the reason for the anomaly was discussed with the participant. He was asked if he had done any physical training or consumed any medications since the first data collection. The participant replied that there were no changes to his routine accept for the practice of AbMT intervention that the participant followed for 7 weeks. The anomaly demonstrated by participant 12 generates an opportunity for further research to investigate if the effect of the three-minute AbMT intervention, practiced more than three times a week for more than six weeks, reverses the effect of stress on one's physiology. Thus:

From the analysis it can be concluded that the quantitative data collection process was robust and that further research is required to investigate the anomaly displayed by participant 12.

2. To examine the effect of project work and of other factors during the eight weeks of the social innovation project, the hypothesis generated was, *HRV scores calculated toward the end of the social innovation project correlate with the HRV scores calculated toward the beginning of the project for all participants*. The variables for the Pearson's coefficient analysis are all the HRV scores collected during the initial phase of the data collection process (number of data points n= 36 values= the baseline HRV score + the pre-stroop HRV score + the post-stroop HRV scores) as compared to the HRV scores collected during the final phase (n=36 values; Degrees of freedom df= [n-2] = 34).

Session name	Participant Number	Towards start of the project	Towards end of the project
Baseline measurement	1	46.3	47.7
	2	43.7	49.6
	3	43.4	42.8
	4	53.6	55.9
	5	47.8	40
	6	40.7	39.3
	7	53.5	48.3
	8	46.7	48.5
	9	39.2	38.6
	10	56.2	43.8
	11	46.6	54.3
	12	50	50.6
Post Stroop RMSSD (ms)	1	45.7	47.4
	2	40.3	43.7
	3	40.2	40.3
	4	50.1	52.6
	5	45.8	38.2

	6	40.1	35.3
	7	52.9	47.2
	8	46.4	48.1
	9	39.3	36.9
	10	52.6	43.3
	11	41.2	46.6
	12	56.5	50.6
Pre Stroop RMSSD (ms)	1	46.4	47.8
	2	43.9	49.6
	3	43.5	42.9
	4	53.8	56
	5	47.9	38.8
	6	40.9	39.5
	7	53.6	48.3
	8	46.6	48.6
	9	39.3	38.6
	10	56.2	43.9
	11	46.7	54.5
	12	50	50.2

Pearson's coefficient is r (34) = 0.278 with the significance calculated as p-value<0.001.

Pearson's coefficient indicates that there is a weak positive correlation between the variables. The significance of the calculated correlation is more than 99%. The hypothesis is verified but with weak evidence. The hypothesis was that HRV scores calculated towards the end of the social innovation project were correlated to HRV scores calculated towards the beginning. The analysis shows that the 8 weeks of working on the social innovation project and any other activities conducted during the 8 weeks, had minimal impact upon the overall physiological stress experienced by participants. However, the small positive correlation indicates that, HRV scores have decreased as the project progressed, which means that there was minor negative impact on the physiology of the participants. The effect of such stress is further explored in the last hypothesis. Thus:

It can be concluded that there was a minor negative effect on the physiology of the participants during the eight weeks of working on the social innovation project.

3. To validate the relationship between the physiological stress response and the dispositional awareness of a person, the hypothesis generated is that:

a. *The response to physiological stress from the Stroop test calculated from the HRV scores correlates to the corresponding MAAS scores for all participants*. The variables for

Pearson's coefficient analysis are the difference between values collected toward the end and those collected toward the start of the project. The data is the set of scores for response to physiological stress created using the Stroop test (HRVpost-stroop – HRVpre-stroop) and the corresponding MAAS scores as shown in the table below. The values for Pearson's analysis are calculated from the data below as [MAAS] and [PSR=HRVpre-stroop – HRVpost-stroop]. Thus, the number of data points n= 22 values= 24 values from 12 participants - 2 sets of values from participant 8 have been discarded because of erroneous MAAS scores; The degree of freedom df= [n-2] = 20.

Session name	Participant Number	MAAS score	Response to physiological stress due to the Stroop test (PSR)= Difference in response to Stroop test [Post-Stroop RMSSD - Pre-Stroop RMSSD] (ms)
Toward the start of the project	1	45	-0.70
	2	56	-3.60
	3	54	-3.30
	4	52	-3.70
	5	34	-2.10
	6	34	-0.80
	7	50	-0.70
	8	~~121~~	~~-0.20~~
	9	54	0.00
	10	55	-3.60
	11	66	-5.50
	12	53	-0.50
Toward the end of the project	1	45	-0.40
	2	53	-4.10
	3	53	-2.60
	4	48	-3.40
	5	32	-0.60
	6	32	-4.20
	7	45	-1.10
	8	~~59~~	~~-0.50~~
	9	50	-1.70
	10	50	-0.60
	11	65	-7.90
	12	52	0.40

Pearson's coefficient is $r(20) = -0.03$ with the significance calculated as p-value<0.05.

This analysis indicates that there is a negligible correlation between the difference in the MAAS score and the difference in the physiological stress response. The p-value indicates the calculated correlation has significance of more than 77%. The hypothesis was that physiological stress response is related to dispositional awareness. However, the analysis shows that for the given data set, when physiological response to stress changes, there is no corresponding change in the MAAS score. The variables do not have a linear relationship,

which can be explored further. Thus, the hypothesis was rejected because a negligible correlation was recognised between the variables.

b. *The difference in the physiological stress response calculated from the HRV scores correlates with the corresponding difference in MAAS scores for all the participants*. The variables for Pearson's coefficient analysis are the scores for the difference in the physiological stress response [$PSR_{\text{toward the end of the project}}$ - $PSR_{\text{toward the start of the project}}$] (where $PSR=HRV_{\text{pre-stroop}} - HRV_{\text{post-stroop}}$) compared to the corresponding difference in MAAS scores [$MAAS_{\text{toward the end of the project}}$ - $MAAS_{\text{toward the start of the project}}$]. Thus, the number of data points n= 11 values= 12 participants - 1 set of values from participant 8 have been discarded because an erroneous MAAS score towards the start of the project made the value for change in the MAAS score unavailable; The degree of freedom df= [n-2] = 9.

Pearson's coefficient is calculated using the same data set as above and Pearson's coefficient $r(20) = 0.545$ with a significance calculated as p-value<0.001.
This analysis indicates that there is a strong correlation between the difference in physiological response to stress and the difference in the dispositional awareness. The p-value indicates the calculated correlation has a significance of more than 99%. The hypothesis was that change in the physiological stress response is related to the change in dispositional awareness. The analysis shows that for the given dataset, when the physiological response to stress changes, there is a very strong correlation with a corresponding change to the dispositional awareness. Thus, the hypothesis is accepted and:

It is concluded that, within the collected dataset, the change in dispositional awareness calculated using the MAAS score and the change in the physiological stress response calculated using the HRV scores have a strong correlation.

4. To investigate the physiological change in the participants due to the practice of the AbMT intervention, the hypothesis generated is that; *the difference in the response to physiological stress from the Stroop test for meditators and non-meditators is inversely correlated.* In hypothesis 2, it was proven that there is small negative effect on the physiology of participants after eight weeks of project work. In this hypothesis, the variables for Pearson's coefficient analysis are the difference in response to physiological stress from the Stroop test (PSR) for meditators (difference in PSR= $PSR_{\text{toward the end of the project}}$ - $PSR_{\text{toward the}}$

start of the project), compared with the difference in response to physiological stress from the Stroop test for non-meditators (number of data points n= 6 values; D=t degree of freedom df= [n-2] = 4).

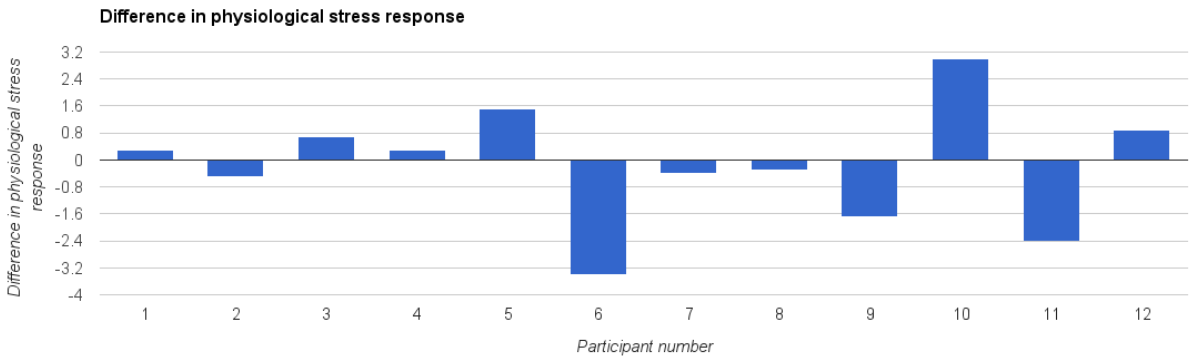
Session name	Participant Number	Change in response to physiological stress due to the Stroop test (change to PSR)= [PSR $_{\text{toward the end of the project}}$ – PSR $_{\text{toward the start of the project}}$]
Meditator	1	0.30
	3	0.70
	4	0.30
	5	1.50
	10	3.00
	12	0.90
Non-meditators	2	-0.50
	6	-3.40
	7	-0.40
	8	-0.30
	9	-1.70
	11	-2.40

Pearson's coefficient is r (4) = -0.522 with the significance calculated as p-value<0.001.

This Pearson's coefficient indicates that there is strong negative relationship between the difference in the physiological stress response of meditators and that of non-meditators. The p-value indicates that the calculated correlation has more than 99% significance or certainty. The hypothesis has been strongly confirmed, which means that the difference in the ability to deal with physiological stress for meditators is opposite to that for non-meditators. The results of the quantitative analysis have then been used to confirm the participants who meditated and the participants who did not meditate by looking up code for participants who agreed to practice the AbMT intervention. The participants that showed positive change in their physiological stress response were asked during de-brief sessions if they meditated and if they considered their practice to be sincere. Following this, an enquiry was made to determine if the participants were undergoing any physical training and exercise or if they had taken any medication or changes to their diet, such as smoking or coffee consumption, which may have affected their ability to deal with stress during the eight weeks the participant worked on the social innovation project. Only one participant (Participant 10) was undergoing physical training. As seen in the graph below, the difference in the physiological stress response for participant 10 is much higher than the others. This means that the participant had developed an ability to deal with physiological stress much more than any

other participant. However, the participant believed that his practice of AbMT intervention was regular and sincere. The participant had accessed the website where the guided practice of AbMT intervention was available. He had accessed the AbMT intervention almost four times every week, for six weeks. Thus, the finding for participant number 10 was confirmed as a cumulative effect of practice of AbMT intervention and physical training. The practice of AbMT intervention was considered effective for the participants who showed positive change to the physiological stress response. These participants are recognised as meditators during this research. On the other hand, the participants showing negative change in their physiological stress response after eight weeks of the social innovation project are confirmed as non-meditators. This can be seen in the graph below.

Figure 6.3: The change in response to physiological stress by each participant after 8 weeks



Participants 1, 3, 4, 5, 10 and 12 demonstrated an improved physiological stress response, which indicates effective practice of AbMT intervention. The website which was used to access the recorded intervention showed these participants accessed the website more than four times each week, for more than six weeks and after careful investigation, it can be confirmed that, participants 1, 3, 4, 5, 10 and 12 effectively practiced the three-minute AbMT intervention and are referred to as meditators during this research.

Participants 2, 6, 7, 8, 9 and 11 are recognised as non-meditators because they showed that their physiological stress response became lower. As seen in the second hypothesis derived for quantitative analysis, the eight weeks of the social innovation project created a minor negative effect on the physiology of the participants, and because the participants did not get any intervention, the effect of stress caused the negative change in their physiological stress response. Participant 6 had an exceptionally lower physiological stress response. The enquiry

into the reasons for such a change revealed that the participant felt very stressed and frustrated during the six weeks of the project, leading to a negative effect on her physiology. The participant reported that she felt anxious about the project's success, which affected her sleep pattern, her eating and working habits. Similarly, participants 9 and 11 also mentioned feeling more anxious and more stressed than usual during the social innovation project, but did not report any significant changes to their sleeping, eating or exercising patterns. Using this information, the number of meditators in the teams was confirmed. Therefore:

It is determined that, Team A with participants 1,3,5,10 and 12, was the team of all meditators. Team B with participant 2, 6 and 11 were all non-meditators. Team C with participants 4, 7 and 9 was a mixed team with both meditators (Participant 4) and non-meditators (participants 7 and 9).

6.4 Chapter Summary

The quantitative data processing revealed the erroneous data, which had to be removed from analysis. The implication of this removal is the increased reliability of outcomes from the analysis process, but there was no negative effect on the process of quantitative analysis (See section 6.2).

The analysis of quantitative data revealed that:

1. The quantitative data collection method was verified and robustly applied.
2. There was a minor negative effect of stress on the physiology of participants after eight weeks of the social innovation project work.
3. It was concluded that, within the collected dataset, the change in dispositional awareness calculated using the MAAS score and the change in the physiological stress response calculated using the HRV scores have a strong correlation indicating the relation between physiology and psychology of a person.
4. The meditators and non-meditators in the teams were confirmed because the quantitative data revealed improved response to psycho-physiological stress as anticipated by the theory. Team A with participants 1,3,5,10,12 were all meditators. Team B participants 2, 6, 11 were all non-meditators. In team C with participants 4, 7 and 9; participant 4 was a meditator and participants 7 and 9 were non-meditators.

The confirmation of effective practice of AbMT intervention by participants can now be fed into the qualitative analysis to understand and compare teamwork during DfSI project by teams with meditators and those with non-meditators.

Chapter 7: Qualitative Data processing and analysis

This chapter presents the peer review and application of the analysis process of the qualitative data and presents the findings.

7.1 Purpose of the Chapter

This chapter presents the qualitative data and explains the application of the qualitative analysis process described in the research method chapter (see section 3.7.2). To comply with the regulation on word count for a doctoral thesis in Design at Northumbria University, and given the large dataset that has been collected, an exemplar of the application of the process of analysis is described in detail in this chapter and a summary of findings are then discussed for the remaining data in the next chapter. The qualitative analysis for the complete dataset is presented in Appendix 1.

7.2 Applying Step 1: Recognising emergent themes

7.2.1 Section Introduction

As described in research method chapter (section 3.7.2), the first step for the process of analysis for the qualitative data is: **Recognizing emergent themes for coarse grain segregation of data** (Marshall and Rossman, 1995)**.** The data was collected on certain pre-recognised themes of investigation by devising open-ended questions for semi-structured interviews to enquire about teamwork by the participants during their respective DfSI projects. However, the data revealed that when answering the questions during the semi-structured interviews, the participants focused on themes that they considered to be important. Such themes were not always the same as the ones selected for this research. Therefore, recognising such emerging themes from the data became an important step during this research so that the data is divided appropriately to study aspects of teamwork during DfSI projects. Thus, the section 7.2.2 explains how such emergent themes were identified from the reflections of the participants on their teamwork. Following this, the questions asked to the participant, the intended themes and the actual themes emerging from data are summarised in table 7.1. The relationship between the themes is then explored.

7.2.2 Explanation of emerging themes from the data

Five key themes were observed in the data provided by the participants while answering the questions asked during the semi-structured interviews. In the first question during the interview, the participants were asked about the multi-disciplinary nature of their team and its affect on their teamwork during the DfSI project. The participants provided reflective data

either supporting or refuting the positive *effect of the multi-disciplinary nature of the team* on the teamwork during DfSI project, which could be verified as the first theme emerging from the data. For the next two questions during the interview, the participants accepted that the size of team and the length of project were important factors, but their answers depicted that the strength and ability to apply knowledge within their team had been more important than the size of the team or the length of the project. Thus, the second theme emerging from data can be said to be, *the effect of the strength and the ability to apply knowledge within the team* on teamwork during DfSI projects.

The fourth question during the semi-structured interview focused on the effect of sponsors on the teamwork. The participants mentioned that they considered the sponsors as the clients during the social innovation projects and that these clients provided input but were not directly involved in designing the solutions. Thus, the third theme recognised from the data can be said to focus on *the effect of client (sponsor) input* on the teamwork during DfSI project. The fifth question focused on the teachers and support staff from the MDI course affecting the teamwork. The participants reflected that the teachers and support staff were not involved during the project and provided occasional guidance, which did not create any significant effect on the teamwork. Most participants did not explain the reasons for teachers not being involved. Two participants, who provided an explanation, could not be completely certain of the reasons for the lack of teacher's involvement and made speculations. Thus, the quotes on the fourth question could not provide any significant information to form a theme on which the teamwork during DfSI projects could be understood and the anticipated theme has been not been considered for analysis of the data (shorthanded as NA). The sixth question during semi-structured interview focused on the effect of the involvement of the community of users and stakeholders on team. However, the participants from all the teams reflected that members and stakeholders from the community provided input and feedback through a series of interviews, online chat groups, web forums and workshops, but were not always directly involved in creating the final solutions. This is because the design teams acted as facilitators and interpreters for the input from the community. Based on this information, the fourth theme recognised from the data pertains to *the effect of input from the community* on teamwork during DfSI project.

The seventh, eighth and ninth questions respectively enquired about the effect of peers from the MDI course, the effect of availability of resources during the project and the effect of any other external factors affecting teamwork. The participants reflected that the peers, the resources and other external factors did not have any significant effect on their teamwork

during their respective DfSI projects. However, some participants provided data about parents and friends, as the external factors helping them at an individual level. Such data is important and could provide insight into the effect of culture/background on teamwork, where culture/background would stand for factors affecting the ability/disposition of a person to work effectively in team during DfSI projects. However, this aspect was not focused on while conducting the interviews, because 'culture/background' is a vast topic and without a review of literature and a predetermined definition, different interpretations of the term 'culture/background' could create erroneous and un-comparable data. Also, any enquiry about the effect of friends and family on the available data provides insight into individual participants, but such data is disparate from each other and cannot be useful for analysis of teamwork. Thus, the reflection from the two participants on their friends and family as external factors influencing their abilities to work within a team has not been considered to provide enough insight for a theme to be used for analysis of teamwork during this research. However, this generates an important aspect of culture/background and its affect on teamwork, to be considered for further research.

The tenth, eleventh and twelfth questions explored the project management aspects of the teams during the DfSI projects. In the tenth, eleventh and twelfth questions of the interview, the participants were asked to reflect on the project planning, the management of time and the day-to-day management of the project respectively while working in teams. While doing so, the participants can focus on the effect of leadership affecting their decision-making process during the planning and management of their DfSI projects. Leadership within the team was not a pre-determined theme during this research because teams were not assigned leaders and were expected to share leadership. But, the teams considered decision-making during the project planning and management as an integral aspect of the leadership within their teams. Due to such assumption on part of the participants, a new theme emerging from the data can be said to be *the effect of leadership* on the teamwork during DfSI projects. This theme has been updated to the list of themes used for analysis during this research. Thus, themes emerging from data which can help to compare teamwork during DfSI projects by the three teams being studied during this research are:

Theme 1. *The effect of the multi-disciplinary nature of the team*

Theme 2. *The effect of the strength and the ability to apply knowledge within team*

Theme 3. *The effect of leadership*

Theme 4. *The effect of client (sponsor) input*

Theme 5. *The effect of input from the community*

The numbering of these themes is based on the sequence in which the theme occurs in the data. This derived list of themes has emerged from a coarse-grained analysis of the data, and it provides a structure on which data can be further divided into quotes for a finer level of analysis. It may be remarked that the big difference between the questions asked based on expected themes as compared to the actual themes, which have emerged from the data, is the shift from asking about the affects of things to the effects of these things as factors for analysis. Table 7.1 below summarises the above discussion.

Table 7.1: Themes of investigation for this research

Question for semi-structured interviews	**Expected theme for investigation**	**Actual theme for investigation**
Q1. How would you say the multi-disciplinary aspect affected your teamwork during DfSI project and why?	Effect of Multi-disciplinary aspect of the team on teamwork during DfSI project	The *effect of the multi-disciplinary aspect of the team* on teamwork during DfSI project.
Q2. How would you say the length of the project affected your teamwork during DfSI project and why?	Effect of Size of team on teamwork during DfSI project	*the strength and the ability to apply knowledge within team* affecting teamwork during DfSI project
Q3. How would you say the size of the team affected your teamwork during DfSI project and why?	Effect of Length of project on teamwork during DfSI project	
Q4. How would you say the sponsor of the project affected your teamwork during DfSI project and why?	Effect of involvement of Sponsor as an external factor on the teamwork during DfSI project	*the effect of client (sponsor) input* on the teamwork during DfSI project
Q5. How would you say the teachers and supporting staff affected your teamwork during DfSI project and why?	Effects of Teachers and support staff as external factors on the teamwork during DfSI project	NA[28]

Continued on the next page

[28] NA- Not Available for analysis

Q6. How would you say the community members and stakeholders affected your teamwork during DfSI project and why?	Effect of involvement of Community as an external factors on teamwork during DfSI project	*the effect of input from the community* on teamwork during DfSI project
Q7. How would you say the peers outside your team affect your teamwork during DfSI project and why?	Effect of Peers as external factors on teamwork during DfSI project	NA
Q8. How would you say the resources (e.g. place, computer, printer etc) affect your teamwork during DfSI project and why?	Effect of Availability of Resources on teamwork during DfSI project.	NA
Q9. Did any other external factors/members affect your teamwork during DfSI project?	Unexpected external factors affecting teamwork during DfSI project	NA
Q10. How would you say the project planning affect of your teamwork during DfSI project and why?	Effects of Project Planning on teamwork during DfSI project	*Effect of Leadership* on teamwork during DfSI project.
Q11. How would you say the time keeping and time management affect your teamwork during DfSI project and why?	Effects of Time management on teamwork during DfSI project	
Q12. Did any other day to day project management aspects affect your teamwork during DfSI project?	Effect of day to day management of project on the teamwork during DfSI project	

7.2.3 The relationship between recognised themes

After updating the list of themes, data on each theme will be analysed to create the depth of information. However, first it is important to understand how the themes fit together and provide a width of information about teamwork during DfSI projects. It is important to re-iterate at this point, that this research aims to understand the effect of AbMT intervention through in-depth information about teamwork, physiology and psychology of the participants; and this scoping of width is for better understanding the data.

The arguments presented show that, multi-disciplinary team structure (theme 1) affected strength and ability to apply knowledge (theme 2) both positively and negatively. For example, the participants reflect that having input from multiple disciplines (theme 1) helped in building each other's strength of knowledge (theme 2) (seen in Q3.1) while another participant reflected that the different disciplinary inputs came into play at different stages of the project (Q7.3). On the other hand, almost all participants mention that lack of common ground between members of different disciplines required extra time and effort, which they perceived negatively during their teamwork during the DfSI project. Thus, it can be said that evaluation of teamwork with regard to the use of multi-disciplinary teams (theme 1) and with regard to the team's ability to share and build knowledge (theme 2) are closely related. Then the question arises why the themes should be kept separate and should not be merged. The data on multi-disciplinary team structure is also related to other themes such as assigning responsibility within the team perceived as leadership within the team (theme 3), which are not exclusively related to the team's ability to build knowledge. Conversely, multi-disciplinary team structure is not the only factor in the data that affected the team's strength and ability to build new knowledge. Thus, the themes on the multi-disciplinary nature of the team and the one on strength and ability to apply knowledge are interrelated but also independent from each other.

As mentioned above, the data can be said to show that leadership (theme 3) was required to help members find their role, which was affected by the multi-disciplinary nature of the team (theme 1). Lack of formal leadership led to the need for self-organisation within the multi-disciplinary teams, which was difficult and time consuming. However, the data on the leadership theme can be said to be associated more with teamwork with regard to project planning and management and is not always associated to the multi-disciplinary nature of teamwork during the DfSI projects. Thus, the leadership aspect is related to yet independent

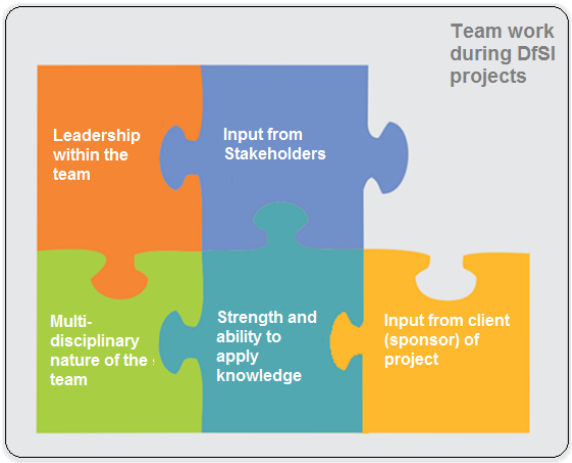
from the multi-disciplinary aspect. There were no arguments tying the effect of the multi-disciplinary nature of the team with the team's ability to gather and utilise input from the client (sponsor) (theme 4) or the community (theme 5). Thus, these themes are not interrelated to each other.

On the other hand, the data reveals that inputs from the client (sponsor) (theme 4) and the community (theme 5) helped the teams to find direction and build strength and ability to apply knowledge (theme 2). Thus, the theme on the team's ability to build knowledge is interconnected to the themes pertaining to inputs from the client (sponsor) and from the different community stakeholders. However, the data pertaining to strength and ability to apply knowledge refers to design knowledge, while data pertaining to leadership refers to project management skills and data does not seem to provide a link between the two. Thus, the theme pertaining to strength of knowledge and the theme pertaining to leadership do not appear to be related to each other in this data.

Similarly, data pertaining to leadership in the team also constituted representing the input from different members and stakeholders of the community and defending the views of one stakeholder in front of the others. Thus, the theme of leadership within the teams appears to be linked to the theme pertaining to the input collected from the community. The themes pertaining to the input from community and those from the client (sponsor) are not interrelated because the data shows the input from the client affected the ideas much later that the input from community.

Figure 7.1 illustrates the interrelated nature of the themes arising from the data.

Figure 7.1: Illustration of the interrelated nature and overlapping themes used for investigation of teamwork during DfSI projects (by author)



7.2.4 Challenges while selecting themes

During this research, themes were selected to categorise the data, so that comparable information depicting the teamwork as applied by the three teams could be derived, and the effect of AbMT intervention on such teamwork can be studied. However, it was not the goal of this research to produce a complete picture of teamwork during the DfSI projects. Whilst the themes selected above provide many details about teamwork, it is acknowledged that these themes cannot be said to describe the teamwork during each DfSI project completely. Another limitation of the research is that in lieu of substantial data provided by the participants, new themes could not be created to compare teamwork during different DfSI projects. E.g. while reflecting on the external factors which may have affected the teamwork (question 9 in table 7.1) participants explained the effect of parents and friends helping them individually to stay calm during their work. Such data is not enough to compare teamwork of the three teams. Thus, such data has been considered to fall outside the scope of this research and remains a limitation for this research.

Following the explanation of step 1, steps 2 through 5 are explained below.

Applying Steps 2, 3, 4 and 5 of qualitative analysis

As described in section 3.7.2, the second, third and fourth steps of analysis are as follows:

Step 2: Creating a Data matrix to organise the data

Step 3: Making Observation

- **Step 3.1: Thematic analysis to recognise arguments made by the participants**
- **Step 3.2: Applying the proposed model of inner values**

Step 4: Finding meaning in language

- **Step 4.1: Derivation of meta-level understanding from thematic analysis**
- **Step 4.2: Interpretation from the Derivation**

To apply these steps, the transcripts of interviews with participants have been divided into quotes and coded as:

$$Q_{Participant\_Number.Quote\_Number.}$$

The themes recognised using step 1 have been employed to divide the entire dataset into systematic tables called a *data-matrix* in step 2. Each data matrix pertains to the quotes

relevant to a particular theme (see section 3.7.2 for reasoning). Thus, for five themes there are five data matrices. The data matrix has three subsections for quotes from each of the three teams participating in this research. The subsections are numbered so that findings can be backtracked to the relevant dataset. The subsections are numbered as:

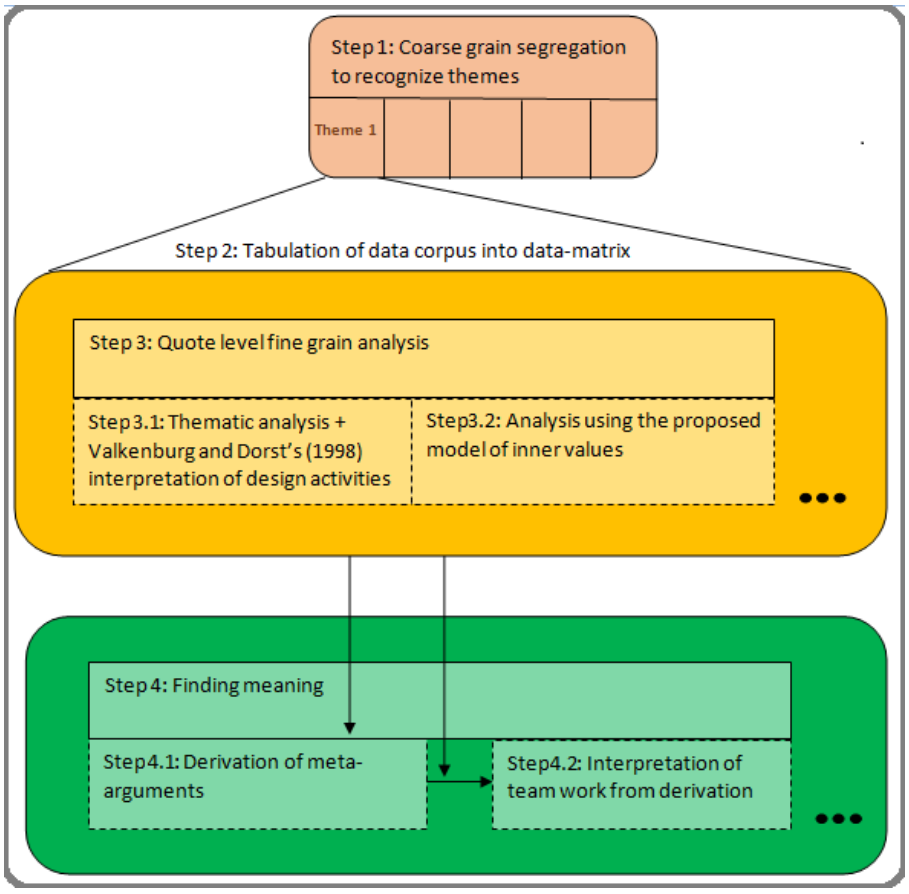
$$\textbf{Subsection}_{\text{Theme\_Number}/\text{Team\_Name}}$$

When thematic analysis (step 3) is applied, the findings from each quote arise in the form of arguments. Each argument is coded as:

$$\textbf{Argument}_{\text{Code\_for\_Subsection}\text{-}\text{Code\_for\_Quote}}$$

The data matrix also shows division of quotes that are *for* and *against* effective teamwork during a DfSI project. This is so that the arguments arising for the quotes are presented sequentially for the convenience of the reader. Figure 7.2 demonstrates the process of analysis in diagrammatic form.

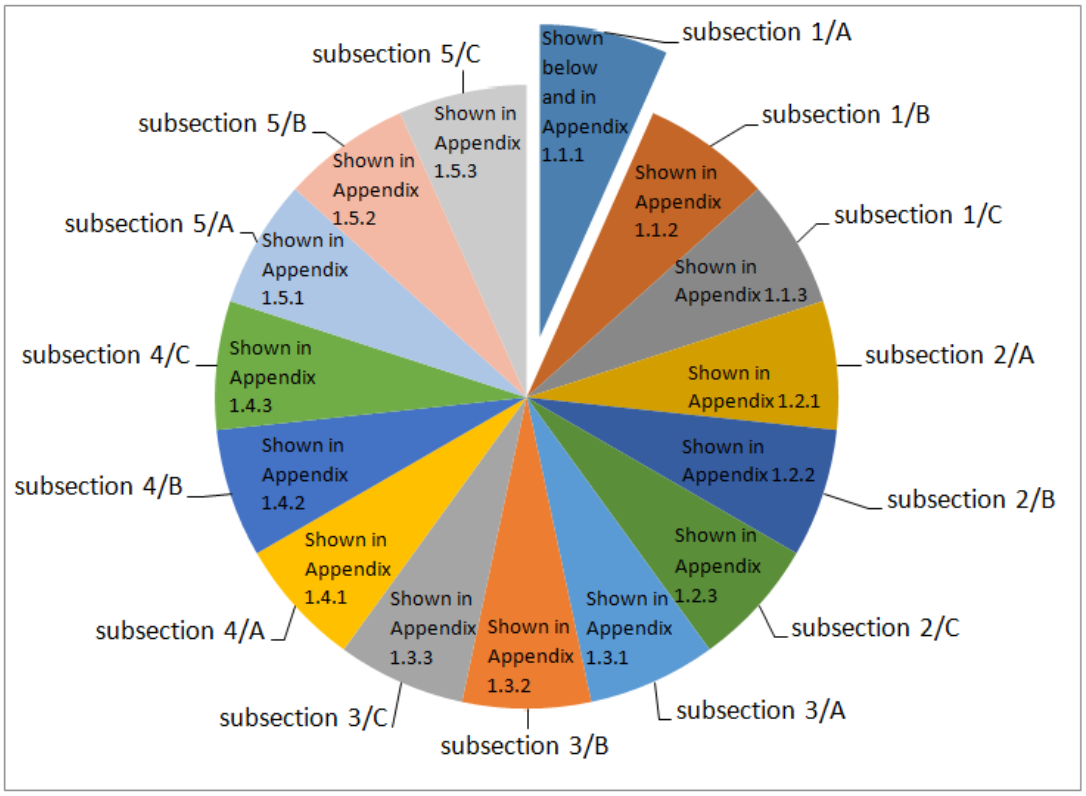
Figure 7.2: The process of qualitative analysis (adapted from O'Conner and Gibson, 2003)



While step 2 divides data into five sections based on themes of investigations, Step 3 and 4 were applied separately for every quote in the subsection of every data matrix. Because of the restriction on the word count for this thesis, analysis of the complete data set has been moved to Appendix 1 and the application of the process of analysis has been demonstrated for only one sub-section, i.e.: Sub-section 1/A, which includes quotes on theme 1 from the participants in team A. The dataset in this sub-section constitutes approximately one-fifteenth of the total qualitative data collected during this research (See figure 7.3 below). This sub-section is chosen because it is a good example to exhibit all the key research decisions/choices made during the application of the qualitative analysis process. The findings from applying the process of analysis on this subsection have been summarised at the end of the exemplar.

Note: The remaining data is presented in appendix along with the findings, the location of which is shown in figure 7.3. The findings are discussed in the next chapter and have not been summarized below to limit word count of the thesis.

Figure 7.3: Location of the remaining data and the corresponding findings



where Sub-section 1/A indicates data pertaining to theme 1 from the participants in team A

Applying the process of analysis described above on data pertaining to theme 1 (The effect of the multi-disciplinary nature of the team on teamwork during a DfSI project): The application of the process of qualitative analysis is shown from page 182 to page 205 and the findings are summarised on page 206.

7.3 Applying Step 2: Creating a Data matrix to organise the data:

The data matrix below is for theme A. It depicts the quote numbers, which either support or refute effective teamwork during DfSI, based on the multi-disciplinary nature of the team. Sub-sections 1/A, 1/B and 1/C depicts quotes from teams A, B and C respectively. The matrix also explains where to locate the complete analysis in Appendix 1.

Participant	**Quotes that support effective teamwork during DfSI**		**Quotes that refute effective teamwork during DfSI**	
Sub-section 1/A: Team A	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	3.1 3.2 3.21 3.26 5.2 5.3 10.1 10.2	These quotes are presented below	1.1 1.3 1.4 12.1 12.4 12.5	These quotes are presented below
Sub-section 1/B: Team B			Quote Number	Where to locate in the thesis
			2.4 6.1 6.10 11.1	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.2
Subsection 1/C: Team C	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	4.1.2 7.1.1 7.3	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.3	4.1.1 7.1.2 9.1 9.2	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.3

The three steps can be applied on every quote for a finer review at a phraseology level. For providing a systematic structure while presenting arguments arising from the data, the quotes supporting effective teamwork by team A are presented first followed by the ones that refute it.

7.4 Applying Step 3: Making Observation for Sub-section 1/A

The first quote is from participant 3, who says:

> *"The thing is that the strength here is that all the different disciplines are coming together and they contribute in the way that we won't be able to contribute. So it's like an exchange of the skills and they would be responsible for things that we won't, you know, be able to help much. So, it all depends on what kind of project - if all those skills are really necessary to work on this project"* [Q3.1].

Step 3.1: Thematic analysis to recognise the arguments made by the participant

The participant explains the general concept of multi-disciplinary working within their teamwork during DfSI as an exchange of skills and a shared responsibility of the project. Thus, it appears that the participant is making an argument that:

Argument 1/A-3.1: *The team shared skills and information with each other during teamwork.*

The participant uses the phrase "*So it's like exchange of the skills and they would be responsible for things that we won't*" (Q3.1). This phrase explains the division of labour created by the team based on their awareness of diversity. It led the team to organize themselves which, based on Valkenburg and Dorst's (1998) explanation, should be coded as a 'framing' activity during the DfSI project.

Note: The argument is numbered as argument 1/A (representing sub-section code) - 3.1(representing quote number).

Step 3.2: Applying the proposed model of inner values

In the quote, the participant mentions "*exchange of skills*" and "*responsible for* (different) *things*" can be said to indicate the inner value of Hopefulness for co-operation within members of team A as the participant can be said to explain the nature of co-operation within team A. The participant does not mention this exchange in terms of good or bad practice, or fair or unfair trade. Instead, the participant mentions, it's the need of the project, which can be said to show that the team possibly had the inner value of being Non-Judgemental. Thus, it appears that the inner values observed in quote 3.1 are {+H+N}. These are visualised as:

The next quote in this sub-section is Q3.2, again from participant 3, and it explains:

> "*For example, they* (business students) *need to have everything planned. And maybe that's why we were quite like organised and, you know, everything was, we knew like within a week what we are doing and what time and what's happening and what outcomes are supposed to be of our actions. So, I think in terms of that it was quite helpful for the project. Like, this kind of approach that everything, you know, was organised. Because I think within design students it won't be possible. These people I think they are more, they are not organised. We cannot, you know, like plan maybe that they were, like precisely. Designers were like, all the aspects, you know, of like kind of creativity and all the visual side of it possibly. And because while we are working we could see all the propositions that others like, I mean business of engineering students, they are giving, they, you know, it's not exact, you know, like nothing like imaginative - it's nothing new. So, definitely the creativity"* [Q3.2].

Step 3.1: Thematic analysis to recognise the arguments made

Though the quote appears disjointed, the audio recording provides clarity that participant 3 is talking about different disciplines complemented their strengths and covered each other's weaknesses. Thus, the argument made by the participant appears as:

Argument 1/A-3.2: *The team invested in development of a shared plan, which organized different aspects of teamwork.*

The team organized and communicated the distribution of workload and responsibilities within the team in a co-owned manner, which can be seen in the quote as a result of team-organizing activities conducted by the team during initial weeks of the project. The activities appeared to lead to improved awareness of the team about their diverse skills and a shared a plan to communicate and share such skills. Such shared planning can be interpreted as a 'frame' of reference, using the explanation from Valkenburg and Dorst (1998). Thus, it can be said that the participant is referring to the 'framing' activity of the team and explaining the effect of such shared frames on teamwork during the DfSI project.

Step 3.2: Applying a model of inner values

The participant appears to describe preconceptions about the attitude of designers, business and engineering members of the team in the above quote. This could be interpreted as a lack of the inner value of Beginner's mind because the team did not have open-minds towards the role each disciplinary member could play during teamwork. Further, the participant highlights the shortcomings of different disciplines saying designers "*are not organised*" and non-designers produce "*nothing new*", which appears to be Judgemental behaviour. As explained in chapter 5, expert design practitioners have revealed that being Non-judgemental does not mean a team member would not have an opinion, it means that, '*judging and*

exploiting situations may not be as counter-productive as literature suggests and it could be a necessary step in the design process during DfSI'. Based on this interpretation, the participant seems to explain how the team's evaluation of strengths and weaknesses were not negative judgments and such an evaluation helped the team to exploit strengths and overcome drawbacks. Thus, the observation of the participant being judgemental or the team lacking the inner value of being Non-judgemental is not accurate but a mere display of the inner value of Acceptance of the teams abilities before manipulating them. Thus, the inner values observed in quote 3.2 are {+A-B} and visualised as:

The participant further mentions,

> "*We had good organisation and that was really important and we had very good communications within the team. Like, you know, everyone could say what they think about the project or what ideas they had and, you know, everything was heard and we had discussions about everything. So I think that was very good and important*"[Q3.21].

Step 3.1: Thematic analysis to recognise the arguments made

The participant highlights the open communication between members of team A, which was an important factor for their effective teamwork. The argument that appears to be presented in the quote is,

Argument 1/A-3.21: *Open communication and discussion of ideas helped teamwork.*

The participant explains that, "*everyone could say what they think about the project or what ideas they had*". The generation of ideas based on a certain understanding of the DfSI project can be categorised as a 'moving' activity using Valkenburg and Dorst's (1998) explanation of design activities. On the other hand, the phrase "*everything was heard and we had discussions about everything*" could be interpreted as part of the collective 'reflecting' activities or as a 'moving' activity or both. Thus, the participant appears to refer to 'moving' and 'reflecting' activities undertaken by team A as part of teamwork during their DfSI project.

Step 3.2: Applying the proposed model of inner values

Everyone being able to "*say what they think"* and share "*ideas"* can be said to reveal the inner value of Hopefulness for co-operation within team A during their teamwork. The participant also mentions "*everything was heard*" and the team discussed "*everything*". This can be said to show the inner value of Acceptance of other's views during teamwork. Thus, the inner values arising from the quote can be said to be {+H+A}, visualised as:

In the next quote the participant mentions,

> "*We solved problems, maybe it was like confidence in the communication within the team. I mean I don't think I had a problem because every time when there was something important I just said that*" [Q3.26].

Step 3.1: Thematic analysis to recognise arguments made

The participant mentions how confidence in the communication within the team was useful for problem solving. Thus, the argument presented appears to be,

Argument 1/A-3.26: *Problem solving through confidence in open communication helped teamwork.*

Solving internal problems, sharing ideas and opinions during the DfSI project was possible in team A due to open communication, which is seen in the phrase, "*we solved problems*". This suggests that the team would 'reflect' and 're-frame' their teamwork based on opinions, suggestions and ideas from individual members of the team. As such activities supported the DfSI project but did not actually contribute directly to the design process, by Valkenburg and Dorst's (1998) explanation, this can be coded as a 'framing' activity. If the participant was talking about ideation then it would be coded as a 'moving' activity and this was confirmed by re-visiting the audio recording, where the participant was talking about the solving of inter-personal problems and not about design activities for creating solutions. Thus, the participant appears to refer to 'reflecting' and 'framing' activities undertaken by team A as part of teamwork during their DfSI project.

Step 3.2: Applying the proposed model of inner values

The phrase pertaining to problems being solved because of, "*confidence in the communication"* reveals the inner value of Hopefulness for co-operation within team A. The participant mentions these experiences occur without defence in the team and mentions, "*every time when there was something important I just said that".* As seen in chapter 5, the inner value of Acceptance means, *'experience an event in a balanced way'* and that, '*Social innovation with design requires you to accept but also have ability to change things.*' The phrase indicates such balanced acceptance with wisdom to change situations existed within team A when the participant uses the phrase, '*saying something that needs to be said*'. This appears to indicate the inner value of Acceptance in team A. Thus, inner values interpreted from quote Q3.26 are {+H+A}, visualised as:

In the next quote, participant 5 mentions,

> "*In a multi-disciplinary team it's like, 'I know this bit, you know that bit. Let's put it together and see if it works', kind of thing. I work better with a multi-disciplinary team, 'cause each person says they're doing something else, and they know more about something else. They focus on that and then will bring it to the table, and they trust ... we trusted each other, like, I know you know about the business, you know about design, so I'll do this and you do that and then we'll put it together"*[Q5.2].

Step 3.1: Thematic analysis to recognise the arguments made

The participant explains, there were complementary skills being exchanged mutually based on trust. Thus, the argument presented in the quote appears to be:

Argument 1/A-5.2: *Development of trust helped to share responsibilities during teamwork.*

During the DfSI project, team members trusted each other to share the completion of tasks between themselves. This stemmed from an awareness of each other's abilities explained by a participant as the philosophy of their team "*'I know this bit, you know that bit. Let's put it together and see if it works', kind of thing."* What the participant refers to is a 'framing' activity that the team performed towards the start of the project, where members of the team

'reflected' on their own strengths and weaknesses and then used that to share responsibility based on a shared 'frame' of reference towards their project. Thus, using the explanation from Valkenburg and Dorst (1998), it can be interpreted that awareness of diversity and clear communication created trust as the common 'frame', which helped the team during 'moving' activities. Thus, the participant appears to refer to 'framing', 'moving' and 'reflecting' activities undertaken by team A as part of teamwork during their DfSI project.

Step 3.2: Applying the proposed model of inner values

The team appears to show the inner value of Hopefulness during teamwork, revealed in the phrase "*I know this bit, you know that bit. Let's put it together and see if it works"*. Further, the participant mentions "*trust*" between the members of the team, which can again be said to be the inner value of Hopefulness for co-operation within team A. Thus, inner values observed in quote Q5.2 are {+H}, visualised as:

When asked if her observation of the exchange of skills would be true if the team was bigger in size, the participant replied,

> "*it doesn't matter what size is it, it depends on the role of each person on the team, because you can have ten people, but they might be really good at doing one thing, like one is a researcher, one is a visualiser, one is... you know?*" [Q5.3].

Step 3.1: Thematic analysis to recognise the arguments made

The participant explains that, the experience of sharing a variety of knowledge in a collegial manner brings value to teamwork during DfSI projects. Even though the quote provides insight into good teamwork, it does not provide an argument because the participant does not mention the quote in relation to teamwork during the DfSI project by team A.

Step 3.2: Applying the proposed model of inner values

The inner values are not determined because the quote is not considered to be relevant to teamwork by team A.

Participant10 takes a different stance on the effect of multi-disciplinary working on teamwork by team A. He mentions,

"*I don't think it would have been better if it was all my discipline, because you wouldn't get the insight of the designers who are more likely to openly minded think about, where probably I would try technical reasons- where what might work and solving problems through that. So, it's probably better having people who have radical ideas and solutions to the problem. I mean with same discipline may be we would have understood each other better and maybe been able to work more efficiently. But I think for the work place in the future, you can't choose who you are working with, it's great sort of practice for that really*"[Q10.1].

Step 3.1: Thematic analysis to recognise the arguments made

According to participant 10, the multi-disciplinary aspect provided drastically different ways of thinking, which was important for problem understanding and solving. Thus, the argument made in the quote appears to be:

Argument 1/A-10.1: *Exchange of skills was possible due to multi-disciplinary team members.*

The diversity of skills provided a learning opportunity, which the members exploited as explained in the phrase, "*Certainly in a work place, you have to get on with whoever you work with really. So this is like good practice, to get to know new people, different people and get along with them and work with them*" (Q10.1). Such activity is coded as 'reflecting', because it directly relates to past activity being used for betterment of future activities duing the DfSI project.

Step 3.2: Applying the proposed model of inner values

The participant mentions, "*wouldn't get the insight of the designers who are more likely to openly minded think about where probably I would try technical reasons",* which can be said to show that the team had the inner value of Hopefulness for co-operation. By focusing on the future, the participant shows preconceptions from the past and for the future, which are described in this research as the lack of the inner value of Beginner's mind. But, as seen in chapter 5, expert design practitioners give importance to understanding when a preconception existed. A lack of beginner's mind would be an improper characterisation because the participant is reflecting during interview but may not have had the preconceptions during the project. If anything, the participant's argument for personal development shows the Beginner's mind may have existed, but this is not definitive from this quote. Thus, the only observation about inner value can be said to be {+H}, visualised as:

Participant 10 further reflects,

"*Certainly in a work place, you have to get on with whoever you work with really. So this is like a good practice, to get to know new people, different people and get along with them and work with them. So I really prefer that, rather than me choosing all my friends. We probably would fit better and be friendly, but I don't think that's the proper way to do it. I think it probably is good haven being chosen rather than choosing your friends. Because you can slack a bit if its only your friends aoo.. you'll leave it till whenever. But some people who you are not good friends with will be like 'we need to do this now'. If it weren't for them you are not gonna do it at all. So it's probably, ya, best this group was made of someone else*"[Q10.2].

Step 3.1: Thematic analysis to recognise the arguments made

The participant is comparing past experiences of working with members of their own discipline who are friendly in the sense of being able to understand each other, but the participant gives more importance to team members helping each other by monitoring progress. The argument can be expressed as:

Argument 1/A-10.2: *Regulation of performance by the team helped teamwork.*

The participant explains the added effort for finding common ground is worth it with the reason that, "*some people who you are not good friends with will be like 'we need to do this now'. If it wasn't for them you are not gonna do it at all*". Thus, the team appears to self-regulate, where members monitored each other's contributions vigilantly. Such activity is coded as a 'reflecting' activity, based on Valkenburg and Dorst's (1998) explanation of design activities, where members provide each other with a key structure to work with and deadlines to work against.

Step 3.2: Applying the proposed model of inner values

The quote shows that team A had the inner value of Hopefulness for co-operation, where team members helped each other out. Further, team A appears to have the inner value of Acceptance of situations because peer review by multidisciplinary team members is accepted as necessary by colleagues, "*having been chosen rather than choosing all friends".* The participant can be said to be making judgements about behaviour of team members in phrases such as, "*you can slack a bit if it's only your friends"* and that members from the same discipline, *"would fit better and be friendly".* However, the audio recording has been re-visited and it is understood that in the phrase the participant does not mean that members of team A were not friendly but the term friendliness seems to be used to describe a common understanding or language. Thus, the phrase, "*people who you are not good friends with, will be like, 'we need to do this now'",* can be said to explain how the participant feels the teamwork during the DfSI project of team A was in-fact effective, even though certain commonalities did not exist. Thus, the team was not judgemental towards each other but had

a positive monitoring system during teamwork. Therefore, the inner values observed in quote Q10.2 can be expressed as {+H+A}, visualised as:

The quotes analysed above appear to provide positive insights that teamwork by team A was effective. Now, the quotes being considered appear to refute such effective teamwork by team A as an effect of the multidisciplinary nature of their team.

Participant 1 reflects on the multidisciplinary aspect of team A and mentions that,

> "*One thing I've realised is I think it takes a lot longer to do anything in an MDI team. Just because obviously everyone's got different working styles and they've got different ideas of how they think the project should go because of their own disciplines. It takes a long time to get started. It takes a long time to find a direction and it can sometimes take a long time to decide who's going to do what based on their skills.*" [Q1.1]

Step 3.1: Thematic analysis to recognise arguments made

The participant talks about the differences in the "*working styles*" leading to "*different ideas of how they think the project should go"*. Time invested in finding a common ground causes delays to start the project and delays to the decisions such as finding appropriate direction and deciding roles based on skills, according to this participant. However, the participant speaks hypothetically and this quote does not make it clear if these delays affected the teamwork during the DfSI project by team A. Thus, the next relevant quote is added to make the meaning more clear. Quote 1.2 speaks about the participant's past experiences and is considered not to be relevant, but the participant follows the observation in quote 1.3:

> "*That's why I say I found these months quite stressful because I'd say everyone to a certain extent is still stuck in their own disciplines, because that's what they're so used to. And as much as they try and make us multidisciplinary, I think everyone still prefers their own discipline because it's what they have the most knowledge of. I know I definitely do and I still find business methods of working more effective than, say, design thinking*"[Q1.3].

Step 3.1: Thematic analysis to recognise arguments made

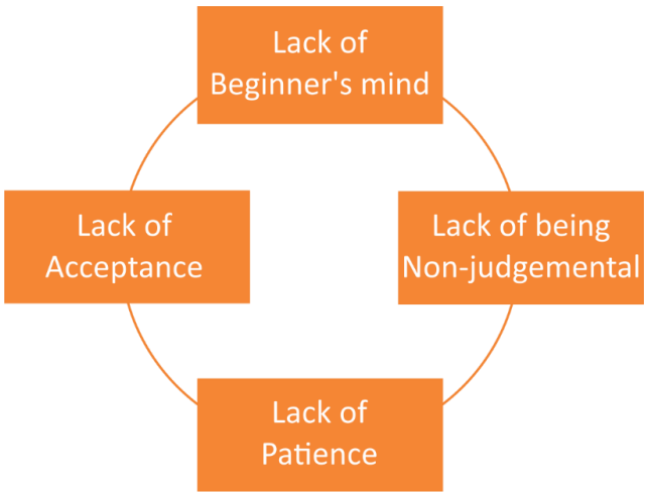
The participant mentions that the members of team A were stuck in their own disciplinary views. The argument is:

Argument 1/A-1.3: *Delays were caused due to extra time required for managing diversity*

The time investment was longer due to the diversity in skills and vision, which was stressful for members of the team. The participant can be said to be explaining 'framing' activities causing delay, because of the lack of common frames within the multi-disciplinary team.

Step 3.2: Applying the proposed model of inner values

The participant explains team members being stuck in their own discipline, which can be said to reveal a lack of the inner value of keeping a Beginner's mind. The participant uses phrases with generalizations such as, "*everyone ... is still stuck in their own disciplines"* and *"everyone still prefers their own disciplines".* These could be interpreted as judgements because, unlike the earlier remarks in quote 1.1, the generalizations are directly related to the teamwork of team A, during the DfSI project. It can now be understood what the participant meant by, "*a long time to get started... a long time to find a direction... a long time to decide* (roles)*",* in quote 1.1. The lack of a Beginner's mind, with a Judgemental attitude creates a perception of delay, which led to the reaction of being stressed before the events could unfold. This can therefore be interpreted as lack of the inner value of Patience. Similarly, the feeling of teamwork during DfSI being "*stressful*" and the confession, "*I know I definitely do and I still find business methods of working more effective than, say, design thinking*", indicates a lack of the inner value of Acceptance of diversity as a situation during the project. Thus, the inner values arising from the quote can be expressed as{-B-N-P-A} and visualised as:



Participant 1 refers to a different issue than the one mentioned in the quote above. He says:

> "*There's ever only been one business student at any point in the team, whereas normally two or three designers. So I think that kind of makes the team dynamic and*

team construct very design-led. So, I'd quite like to see a more even spread... of business, designers and technologists. Because I think that's the only way you can actually be multidisciplinary because at the minute, there's so many designers, naturally they sort of side with each other, because they think their method of working is preferred. So I don't really see it as multidisciplinary learning because it's just been a couple of months of following designers to a certain extent" [Q1.4].

Step 3.1: Thematic analysis to recognise the arguments made

The participant implies the negative impact of the multidisciplinary nature of the team by arguing that the opinions of other disciplines were not represented as much as those from Design, but does not provide an explanation of whether the teamwork was affected negatively. Therefore, an argument cannot be explicitly drawn on the effect of the multidisciplinary nature of the team on the teamwork by team A. However, the participant does identify the motive for the creation of the teams as design-led because of the DfSI project.

Step 3.2: Applying the proposed model of inner values

The inner values are not determined because the quote is not considered to be relevant to teamwork by team A.

Participant 12 explains:

"*In this context, for this social innovation, originally before I started the project, I thought it would be good to have a mix, because it's social and design is not all about socials, so you know, there's business in there, there's also social work in there. But actually, I think if it was all designers, it would have probably gone smoother because everyone's on the same page. Everyone usually, the design teams that I've worked in, in the past, have got a base level of understanding, which was missing in this group. So you almost got the foundation and then you couldn't, if you come up with any problems or any lack of knowledge or experience... so I think the makeup of the group to start with was quite difficult... What I was really hoping for was that everyone would really play to their strengths, and take the initiative... but unfortunately that didn't really happen, so it was a bit more like the stronger personalities in the team rather than a stronger skill sets in the team take control, so it wasn't as balanced as I'd like it to be*" [Q12.1].

Step 3.1: Thematic analysis to recognise the arguments made

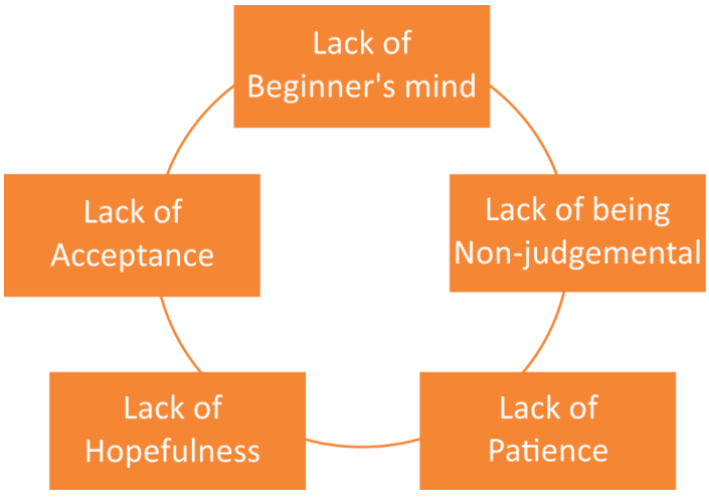
The participant explains how in team A the members from multiple disciplines lacked a common understanding, which made it difficult to start any activity during the DfSI project because the initiative was not always taken by team members with appropriate skills. The argument by the participant can be said to be:

Argument 1/A-12.1: *Initiatives were not always taken by members of the stronger skill-set.*

The ability to take an initiative is dependent on many factors, including but not limited to; 'personality', 'language', 'culture', 'knowledge', 'leadership skills' etc. The participant explains, "*What I was really hoping for was that everyone would really play to their strengths, and take the initiative... but unfortunately that didn't really happen*". Such initiative taken within a team during different activities can be interpreted as a 'framing' and/or 'moving' activity based on Valkenburg and Dorst (1998).

Step 3.2: Applying the proposed model of inner values

The participant's reflections on the teamwork of team A start with, Hopefulness for cooperation, where the participant thought, "*it would be good to have a mix*". However, the lack of a Beginner's mind is seen where the participant expected, "*a base level of understanding*". This expectation led to judgements such as, "*makeup of the group to start with was quite difficult*". This led to a lack of Patience where, "*stronger personalities in the team rather than stronger skill sets in the team* (took) *control*". The participant reflects in the phrase, "*it wasn't as balanced as I'd like it to be*", that shows a lack of Hopefulness for co-operation during teamwork and a lack of Acceptance of the situation. Thus, the participant reveals a lack of; the inner value of a Beginner's mind, being Non-judgemental, Patience, Hopefulness and Acceptance, which can be expressed as{-B-N-P-H-A} and visualised as:



Participant 12 further explains the effect of the multidisciplinary nature of the team and mentions:

> "*People's confidence is one thing, I think because they come from different disciplines, people's skill sets was so far removed. Everyone's work... the skill sets are still so far removed from each other... and personality. You're working with; multidisciplines,*

multi-personalities, and multi-cultures all in one, which is three big factors, and so trying to find a common working ground on all of that at base level, with the sort of skill level you've got is really hard, so there was more time taken trying to work out what people can do and how people can do it, than actually doing it, which is frustrating" [Q12.4].

Step 3.1: Thematic analysis to recognise the arguments made

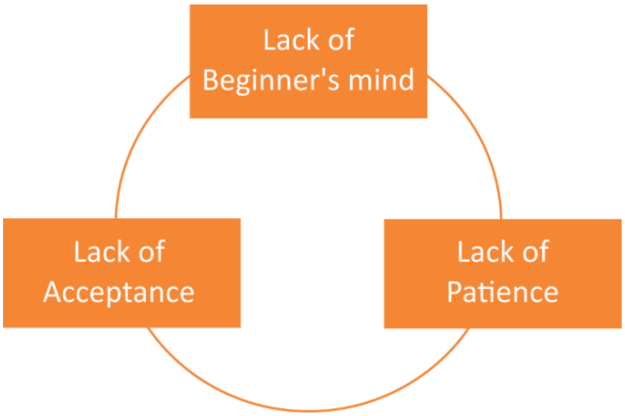
The participant explains that the skills of members of team A were far removed because the team comprised; multiple disciplines, multiple personalities from multiple cultures. The argument in this quote can be:

Argument 1/A-12.4: *Delays were due to the time required to handle team diversity*.

Delays were also caused due to, "*trying to find a common ground for teamworking … there were more times taken trying to work out what people can do and how people can do it, than actually doing it, which is frustrating*"(Q12.4). Such activities by the team are coded as 'framing', based on Valkenburg and Dorst's (1998) explanation of design activities, where finding a common frame of reference was difficult, time consuming and often stressful and may have delayed the 'moving' activities in team A, based on the quote.

Step 3.2: Applying the proposed model of inner values

The participant again explains how the team lacked the inner value of a Beginner's due to differences in personalities and differences in cultures in addition to the differences in disciplines, which affected team A during their DfSI project. The participant explains, finding; "*common working ground on all of that at base level is really hard*", because of the, "*more time taken trying to work out what people can do and how people can do it, than actually doing it".* These sentences show a lack of Patience. The use of the phrase, "*which is frustrating*", shows that there was a lack of Acceptance by team A, due to its multidisciplinary nature during DfSI, or it could have been attributable to the multiple-personalities or multiple-cultures. Thus, the inner values observed in the quote are; a lack of Beginner's mind, Patience and Acceptance, expressed as {-B-P-A} and visualised as:



Participant 12 concludes in the following quote:

> "*If I'd been in a team of skilled designers, I feel I could have delivered a lot more. But I was happy with what we delivered at the end, you know, what we delivered was good, and despite our differences, we did rally together and came up with the goods at the end, but it was a struggle, if I'm honest. It was a struggle, so I think we did our best as a group with what we could have done in a team, but I think in that time if I was working with people that I've worked with in the past, just in terms of designers, it would have been a lot more effective, just because almost they're more narrow minded and they're all on the same page*" [Q12.5].

Step 3.1: Thematic analysis to recognise the arguments made

The argument presented can be interpreted as:

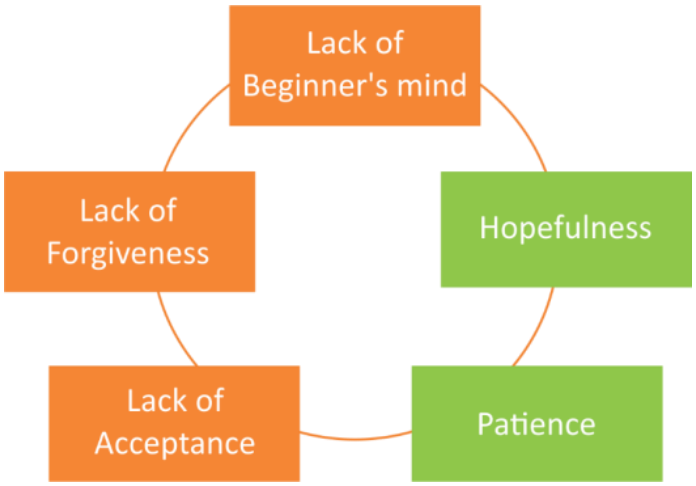
Argument 1/A-12.5: *Struggles due to diversity did not affect design outcomes.*

The participant mentions: "*despite our differences, we did rally together and came up with the goods at the end, but it was a struggle, so I think we did our best as a group with what we could have done in a team*". This appears to denote that 'moving' activities, as explained by Valkenburg and Dorst (1998) were difficult but ultimately successful.

Step 3.2: Applying the proposed model of inner values

The participant mentions phrases such as, "*despite our differences, we did rally together*" and "*we did our best as a group*", which show Hopefulness for co-operation during the teamwork by team A. The participant mentions, "*despite our differences, we did rally together*", which shows the inner value of Patience. However, the participant can be said to show a lack of the inner value of Acceptance of others' views in the wishful thinking seen in the phrase, "*If I'd been in a team of skilled designers*" and the use of phrases such as "*it was a struggle*". In fact, the participant repeats the phrase "*it was a struggle*", which indicates a lack of Forgiveness. The participant adds to findings that, multi-disciplinary working needs to be practiced with Hopefulness for co-operation and because team A did this, their teamwork

created satisfactory outcomes. However, the participant shows a lack of Acceptance of other's views leading to a lack of Forgiveness. Thus, the inner values observed were {-B+H+P-A-F}, visualised as:



Thus, step 3.1 has been applied on every quote for thematic analysis to derive arguments which depict fine-grain understanding of the data. Step 3.2 has been used to apply the proposed model of inner values using the way in which phrases were articulated by the participants. Step 4 can now be applied to combine these identified arguments into meta-arguments (step 4.1) and combine and validate the observation made regarding inner values to visualise the inner value system of the team with regard to the multi-disciplinary aspect of the team.

7.5 Applying Step 4: Finding meaning in language for Subsection 1/A

Step 4.1: Combining arguments from the thematic analysis to create meta-arguments

The team shared a vision of project teamwork within the first week (See argument 1/A-3.2: *The team invested in the development of a shared plan, which organized different aspects of teamwork*). The team members trusted each other's abilities and commitments, which is coded as a 'framing' activity conducted by the team (See argument 1/A-5.2: *Development of trust helped to share responsibilities during teamwork*). Such 'framing' activity around diversity of the multidisciplinary team seems to have helped during 'moving' activities (argument 1/A-3.1: *The team shared skills and information with each other during teamwork*), where design ideation is described as being radical (Q10.1). The meta-argument

that can be said to emerge about the teamwork by members of team A during DfSI project seems to be, '*In team A, different disciplines complemented each other and shared responsibilities for the project*'.

Further, the team members shared ideas (See argument 1/A-3.21: *Open communication and discussion of ideas helped teamwork*) during 'moving' activities along with 'reflecting' activities on possible solutions to the DfSI project. The members resolved inter-personal issues within the team through open communication and discussions (See argument 1/A-3.26: *Problem solving through confidence in open communication helped teamwork*). The discussions for resolving interpersonal issues can be coded as 're-framing' activities. Thus, the 'moving', 'reflecting' and 'reframing' activities appear to lead to the meta-argument that '*In team A, open communication within the team helped share ideas, discuss and solve problems*'.

Within team A, the team members monitored each other's progress (See argument 1/A-10.2: *Regulation of performance helped teamwork*), providing deadlines and feedback, which can be considered as 'moving' and 'reflecting' activity and such activities led to personal development for members of team A (See argument 1/A-10.1: *Exchange of skills was possible due to multidisciplinary team members*). Such 'moving' and 'reflecting' activities reveal meta-argument that, '*In team A, the multidisciplinary nature of the team provided unique learning opportunities for personal growth*'.

On the other hand, the team members explain that extensive time was required for 'framing' activities to deal with the diversity of the multidisciplinary team, which was stressful (See Argument 1/A-1.3: *Delays were caused due to extra time required for managing diversity*).Prolonged framing activity also led to delays to the 'moving' activities during the DfSI project and this was a struggle for some team members (See argument 1/A-12.4: *Delays due to management time required to handle diversity in disciplines*). Initiatives in tasks was sometimes taken up by members with stronger personalities rather than those with stronger skill-sets (See Argument 1/A-12.1: *Initiatives were not always taken by members of the stronger skill-set*) and though this did not affect the design outcomes of the DfSI project, it increased the difficulty of the design process due to multidisciplinary teamwork (See Argument 1/A-12.5: *Struggles due to diversity did not affect design outcomes*). Thus, the meta-argument can be said to be '*Team A had to create a shared understanding, which was*

time consuming and felt taxing to certain members while working in team during the DfSI project'.

Step 4.2: Combining observations from the model of inner values with meta arguments from the thematic analysis

The meta-arguments provide an outline to extrapolate inner values demonstrated at the quote level, to determine the inner values at the team-level. The meta-arguments supporting effective teamwork by team A with regard to the multidisciplinary nature of the team are discussed first and then those refuting effective teamwork by team A are discussed.

Meta-Argument 1: '*In team A, different disciplines complemented each other and shared responsibilities of the project*'

Evidentiary quote: Q 3.1, Q3.2, Q5.2 and Q 10.1.

Brief summary of findings from the thematic analysis: Framing activities helped the team build actions where the weaknesses of a discipline were compensated by the strengths of others (Q3.2). Further, the team members trusted each other during 'moving' activities to share their disciplinary views for teamwork during the DfSI project (Q 5.2).

Inner values observed in the data: Inner values have mostly been evaluated one at a time here. However, multiple inner values are presented together when they can be evaluated together with expediency.

Inner value: Hopefulness for co-operation (Q3.2, Q5.2, Q10.1)

Evidence: The thematic analysis revealed that the team members were able to initiate co-operation and create shared 'frames' where they mutually distributed their responsibilities and relied on each other's disciplinary expertise during 'moving' activities for the success of their DfSI project. Thus, the data reveals evidence of Hopefulness for co-operation in team A during the different 'framing' and 'moving' activities, which matches with the observations made by applying the proposed model of inner values.

Finding: The observation of Hopefulness is confirmed as the inner value for the team (Q3.1, Q3.2, Q5.2, and Q10.1).

Inner value: being Non-judgemental (Q3.1)

Evidence: The observation made by applying the proposed model of inner values on quote Q3.1, shows one of the members of the team reflecting on 'framing' activities undertaken by their team and explains their team's decisions were based on the needs

of the project. This was considered as non-judgemental, but it is the member of the team who reflected objectively. However, the evidence is not clear whether the inner value of being Non-judgemental was an inner value of the entire team or just of that particular member during the DfSI project.

Findings: the team may have exhibited the inner value of being Non-judgemental during teamwork for the DfSI project.

Inner value: Acceptance (Q3.2)

Evidence: The observation of the inner value of Acceptance comes from an understanding arising from the supporting study, where expert DfSI design practitioners considered the judgement of one's own weakness as a necessary step to accept shortcomings. The team accepted their disciplinary shortcomings, divided responsibility and discussed progress frequently and freely. The participant explains this with multiple examples of 'framing' and 're-framing' activities during their DfSI project. Thus, the observation made from applying the proposed model of inner values appears valid.

Findings: the inner value of Acceptance is verified from the evidence (Q3.2).

Meta-Argument 2: '*In team A, open communication within the team helped share ideas, discuss and solve problems*'

Evidentiary quote: Q 3.21 and Q3.26.

Brief summary of findings from the thematic analysis: Open communication within the team helped 'moving' activities such as sharing ideas and helped 'reflecting' activities of discussing such ideas (Q 3.21). Open communication also helped in resolving interpersonal issues (Q 3.26) which may be coded as 're-framing' activities.

Inner values observed in the data:

Inner value: Hopefulness for co-operation (Q3.21, Q 3.26)

Evidence: The open communication during 'framing' activities appear to be due to the inner value of Hopefulness for co-operation and this in-turn had an effect on open communication during possible 'reflecting' and 'reframing' activities. Thus, the observation made by applying the proposed model on inner values is valid.

Findings: Hopefulness for co-operation is an inner value of the team (Q3.21, Q 3.26).

Inner value: Acceptance (Q 3.21, Q3.26).

Evidence: The act of sharing and discussing ideas, coded as a 'moving' activity, and the act of deliberating as a team, coded as a 'reflecting' activity, were possible due to open communication. Such activities are associated with the inner value of Acceptance of other team members' ideas and opinions (Q3.21) and acceptance of challenges during deliberation by other members of the team (Q3.26). The inner value of Acceptance is also seen during the 're-framing' activities, where the members of team A resolved inter-personal issues (Q3.26). Thus, the observation made by applying the proposed model of inner values that, team A had the inner value of acceptance of the situation, can be said to be valid.

Findings: Acceptance is an inner value of the team (Q 3.21, Q3.26)

Meta-Argument 3: '*In team A, the multidisciplinary nature of the team provided unique learning opportunities for personal growth*'

Evidentiary quote: Q 10.1 and Q10.2.

Brief summary of findings from the thematic analysis: the multidisciplinary nature of the team presented unique learning opportunities for personal growth through the 'reflecting' activities. Such reflecting activities are associated with the development of personal skills to handle the future work place (Q10.1). Learning also was possible during the 'moving' activity because the team members for different disciplinary backgrounds helped to provide structure, plan and deadlines and monitored each other's progress closely (Q10.2).

Inner values observed in the data:

Inner values: Hopefulness (Q10.1, Q10.2) and Acceptance (Q10.1)

Evidence: The participant has made an important argument that a person does not get to choose who to work with at the work place and the ability to get along with people is an important skill, which the study shows was learnt through 'reflecting' activities leading to personal development. Such ability appears to be associated with the inner value of Hopefulness for co-operation during teamwork and also in the future. The team members also offered each other structure and deadlines and monitored each other's progress during the team's 'moving' activity, which shows that the team accepted each other's opinions and support. Because this attitude existed during the DfSI project, the inner value of Hopefulness for co-operation and Acceptance of the situation appears to exist during teamwork by members of team A and the observations made by applying the model of inner values can be considered to be valid.

Findings: The inner values of Hopefulness and Acceptance existed in team A (Q10.1 and Q10.2).

Meta-Argument 4: '*Team A had to create a shared understanding, which was time consuming and felt taxing to certain team members during the DfSI project*'

Evidentiary quote: Q 1.3, Q12.1, Q12.4 and Q12.5.

Brief summary of findings from the thematic analysis: The 'framing' activities for organizing the teamwork took a lot longer than expected, which some members of team A found difficult (Q1.3 and Q12.4). The team members mention that initiatives were not always taken by subject experts (Q12.1), which was not expected. However, this did not affect the outcomes designed by team A, some members of the team struggled during the project because of the multiple disciplines involved in the DfSI project (Q12.5).

Inner values observed in the data:

Inner value: lack of Beginner's mind (Q1.3, Q12.1, Q12.4)

Evidence: The 'framing' activity took a long time because team members had different disciplinary expertise (Q1.3) and this diversity made it difficult to find a common ground or a common 'frame' of reference for the team. Thus, the team can be said to lack the inner value of a Beginner's mind, which led to delays during the DfSI project. The observation made by applying the proposed model of inner values can therefore be considered a valid observation.

Findings: The lack of a Beginner's mind is an inner value for the team (Q1.3, Q12.1, Q12.4).

Inner value: lack of being Non-judgemental (Q1.3, Q12.1).

Evidence: When applying the proposed model of inner values, the use of generalizations was used to denote certain phrases, which show that there Isa lack of the inner value of being Non-judgemental (Q1.3, Q12.1). However, the delay due to the 'framing' activity suggests that the team used these judgements to manipulate their own weakness and build strength by sharing knowledge. The survey with expert design practitioners recognises this as an important part of the design process and therefore the observation of a lack of the inner value of being Non-judgemental could be considered of low consequence to teamwork during the DfSI project.

Findings: The team may have lacked the inner value of being Non-judgemental.

Inner value: lack of Patience (Q1.3, Q12.1, Q12.4).

Evidence: 'Framing' activities required additional time and effort than the team members expected. They mention this as a cause of anxiousness (i.e.; struggle- Q12.4 and stressful- Q1.3). One of the consequences of such delays on teamwork was that stronger personalities took the initiative to avoid delays, rather than the subject experts (Q12.1). This appears to indicate a lack of the inner value of Patience in the team. Thus, the observation of a lack of patience made by applying the proposed model of inner values is valid.

Findings: The lack of the inner value of Patience is an inner value for the team (Q1.3, Q12.1 and Q12.4).

Inner value: lack of Acceptance (Q1.3, Q12.1, Q12.4).

Evidence: Some of the drawbacks of the multidisciplinary team structure in team A have been explained as a lack of a common 'frame' of reference (mentioned in Q12.1), the investment of a long-time to create such common frames, leading to delays in the 'moving' activities (Q12.4) and causing the DfSI project to become design-led rather than multidisciplinary (Q1.3). These steps and the associated stress and anxiety were considered unnecessary by the members of the team. However, these activities could be considered important during the DfSI project and the team members appear to show a lack of the inner value of Acceptance. Thus, the observation made by applying the proposed model of inner values is considered to be valid, that the team lacked the inner value of acceptance of the situation.

Findings: Lack of Acceptance is considered an inner value for the team (Q1.3, Q12.1).

The meta-arguments have been used to check validity of all the observed inner values when model of inner values was applied in step 3.2. Now the findings from thematic analysis (steps 3.1 and 4.1) and the findings about the possible inner value system of the team (step 3.2 and 4.2) are summarised so that they can be used for discussion so that conclusions can be drawn about the effect of AbMT on teamwork during DfSI project.

7.6 Summarization of Findings and observation for Subsection 1/A

7.6.1 Thematic analysis

The findings from the thematic analysis reveal several arguments, which lead one to derive four meta-arguments. They are:

Meta-argument 1. '*In team A, different disciplines complemented each other and shared responsibilities of the project*'.

The team shared a plan for their teamwork by investing in 'framing' activities during the first week of the DfSI project (See argument 1/A-3.2) and created trust, which has been interpreted as a 'frame' on which teamwork was based (See argument 1/A-5.2). Such 'framing' activities around the diversity of the multidisciplinary team seems to have helped the team during 'moving' and 'reflecting' activities such as ideation and discussion (argument 1/A-3.1).

Meta-argument 2. '*In team A, open communication within the team helped share ideas, discuss and solve problems*'.

By conducting 'reflecting' activities through open and honest communication, the team members could conduct 'moving' activities effectively, such as sharing and discussing ideas (See argument 1/A-3.21) and 're-framing' teamwork by resolving inter-personal issues (See argument 1/A-3.26).

Meta-argument 3. '*In team A, the multidisciplinary nature of the team provided unique learning opportunities for personal growth*'.

The team members conducted 'reflecting' activities by monitoring each other's progress, providing deadlines and feedback (See argument 1/A-10.2), which aided further 'reflecting' activity at personal level which is required for personal professional development (See argument 1/A-10.1).

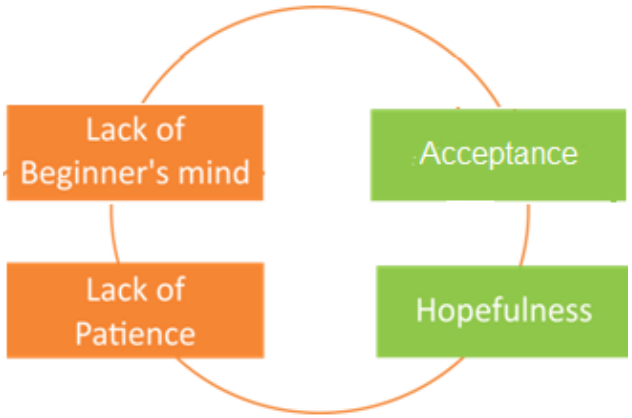
Meta-argument 4. '*Team A had to create a shared understanding, which was time consuming and felt taxing to certain members during the DfSI project*'.

The team spent an extensive amount of time and effort developing a common 'frame', to be able to deal with the multidisciplinary nature of their team, which was stressful at times (See argument 1/A-1.3). This caused delays to the subsequent 'moving' activities and felt like a struggle for certain members of the team (See argument 1/A-12.4). At times, this led to stronger personalities rather than those with stronger skill-sets taking initiative during a task (See Argument 1/A-12.1) and though this did not affect design outcomes of the DfSI project, it increased difficulty in the design process due to the multi-disciplinary nature of the team (See Argument 1/A-12.5).

7.6.2 Inner values

The arguments reveal that the team perceive their initial 'framing' activities to be essential for effective use of diversity of their multidisciplinary team, for trust and open communication and for the development of personal professional practice. The first three arguments can be said to consistently reveal the inner values of 'Hopefulness' (Q3.1, Q3.2, Q 3.21, Q3.26, Q5.2, Q10.2 and Q12.1) and 'Acceptance' (Q3.2, Q 3.21, Q3.26, Q1.3, Q1.4, Q12.1 and Q10.2) existed within their team. However, the fourth argument reveals certain weakness within teamwork as perceived by the team members. The delays, due to extended 'framing' activities, caused anxiousness and stress and have affected the 'moving' activities, where the initiative was not always taken by the most knowledgeable team member. Such drawbacks reveal that the team may have lacked the inner values of; 'Beginner's mind', which caused delays and may have lacked the inner value of 'Patience' when the initiative was taken by someone with a stronger personality, rather than a stronger skill-set. Based on these observations, the diagrammatic representation of inner values of team A with regard to the multidisciplinary aspect is expressed as: {+H+A-B-P}.

Figure 7.4: Inner values of team A towards Multidisciplinary teamwork during the DfSI project



This concludes the findings made from the qualitative analysis of the data. Some reflections have been noted below to reveal the understanding of the researcher about the data and findings.

7.6.3 Reflection

The members of team A reflected on the multidisciplinary nature of their team. They seem to focus primarily on the advantages and disadvantages around 'framing' and 'reflecting'

activities conducted by their team and they seem to agree that their 'framing' activities, though challenging, had an overall positive effect on their teamwork during the DfSI project. The team can be said to express effective use of diversity of multiple disciplines during the 'moving', 'reflecting' and 're-framing' activities that followed the initial 'framing' activity. Such 'framing' activities appear to be stressful and challenging due to the diversity of the multidisciplinary team.

7.7 Chapter Summary

This chapter focused on explaining the application of the process of qualitative analysis. The chapter presents how the themes of investigation were determined, how the data was organized and how the data was analysed (Section 7.3). Step 1 of the process of qualitative analysis produced a coarse-grained understanding of teamwork during the DfSI projects (See section 7.2). Steps 2, 3 and 4 were exemplified for brevity using $1/15^{th}$ part of the total data-set. The complete data analysis is available in Appendix 1. Step 2 demonstrates how data is organized into the data matrix (See section 7.3) and how the matrix is useful for backtracking data and analysis using the sub-section numbers. Step 3 (See section 7.4) describes the fine-grain analysis of data using thematic analysis to derive arguments made by participants regarding their teamwork during the DfSI projects. The context of the argument is understood using Valkenburg and Dorst's (1998) explanation of design activity. Finally, the proposed model of inner values applied to understand which inner values could be recognised from the data. Step 4 (See section 7.5) demonstrates how the arguments combine from thematic analysis to form a better understanding of teamwork during DfSI project. They have been called meta-arguments. Such meta-arguments have been used to bring together inner values observed by applying the proposed model. Then the understanding of inner values developed from survey study has been used to logically verify the observations made from applying the model of inner values. Finally, a summarisation of findings from the one subsection being analysed has been presented (See section 7.6). Analysis and summaries of findings are located in Appendix 1 (shown in figure 7.3 recreated below) and these summaries have been used in the next chapter to discuss and compare the teamwork during the three DfSI projects, as understood from the data collected from the respective team members.

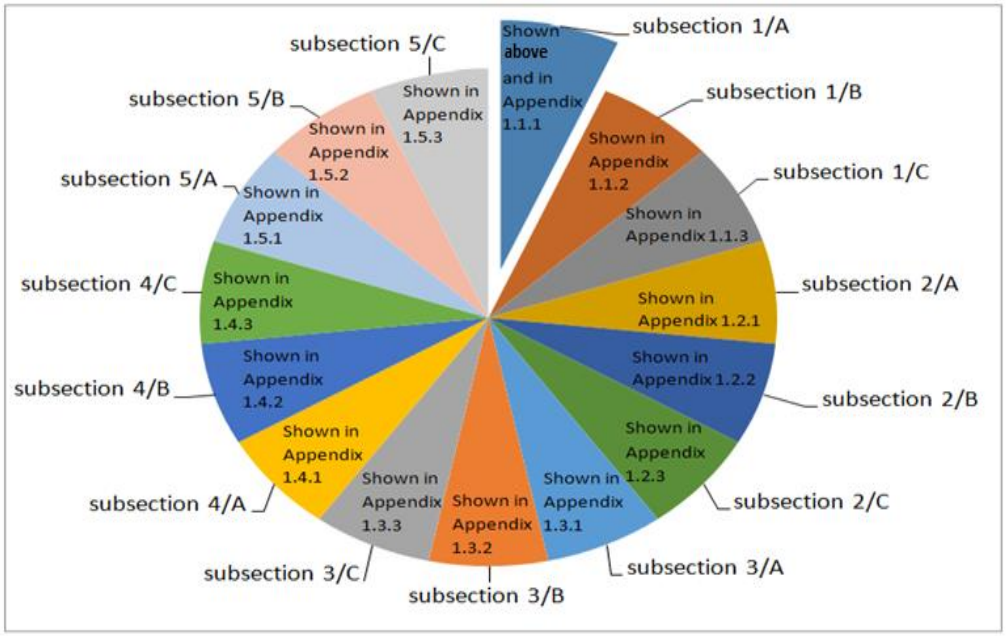


Figure 7.5 (recreated): Location of the remaining data and the corresponding findings

Chapter 8: Discussion Chapter

The chapter provides discussions of quantitative data and qualitative data to compare the findings from data analysis with the relevant theories from literature, so that conclusions and limitations can be drawn from this research.

8.1 Purpose of the chapter

Discussions in this chapter utilise relevant literature to understand findings from different data analyses. This chapter starts by discussing the findings from the quantitative analysis to draw out the theoretical relationship between the physiological and the psychological aspects of participants undertaking teamwork during the DfSI projects. Following this, the identified themes of enquiry for qualitative analysis have been used to discuss the teamwork by the three teams studied during this research. Finally, this chapter presents a triangulation to draw out an understanding of how the physiology, psychology and behaviour appear to be related to each other in the context of teamwork during the DfSI projects.

8.2 Discussion on the findings of the quantitative analysis

The physiological stress studied by different scientists shows that a reduction in physiological stress measured using HRV is related to the increased executive functioning, faster reaction times and more correct responses to cognitive tasks (Hansen, Johnsen,& Thayer, 2003; Rauch et. al., 2011; Kofman et. al., 2006; Renaud and Blondin, 1997). This is because increased HRV is considered one of the factors which counters the vagal lowering effects of chronic stress. This has not only been associated with improved cognitive performances, but also with emotional development (Kofman et. al., 2006; Lazarus, 2006; Rauch et. al., 2014; Davidson et. al., 2012; Gregório and Pinto-Gouveia, 2013). Improved emotional choices have been proven as a result of slowed respiratory rate and resultant increased HRV (Rauch et. al., 2011). In light of this literature, the hypotheses that were created and have been verified during this research are:

1. When psycho-physiological stress is applied using a stress inducing Stroop test, the HRV lowered every time for every participant during this research (Section 5.3.3-1). The literature shows that the physiological response to a stressful situation remains relatively constant between individuals (Sgoifo et al., 2003) and that individuals who are very sensitive to stress will remain so in any stressful situation. This is proven to be the case through the first hypothesis for quantitative analysis during this research.
2. Yerkes-Dodson law suggests that the relationship between performance and stress is in an inverted U (Yerkes, and Dodson, 1908; Vaa, 2014); low stimulation of the physiology of a person will not lead to a performance increase and over-stimulation

will also have no performance benefits (Kofman et al., 2006). Mental arousal (stress) in a person is dependent on many factors, including; day-to-day activities, food intake, sleep pattern, use of stimulants, and exercise etc. However, if most factors remain the same over a period of time, then the level of physiological stress should also remain constant (Kofman et al., 2006). This needed to be verified and became the second hypothesis during the quantitative analysis of this research. The participants consistently showed lowered HRV scores after eight weeks of DfSI project-work (Section 5.3.3-2). With the literature in mind, the participants were asked if their sleep-exercise-food patterns and their general life style underwent any major alteration during the eight weeks of the project. They reported that there were no significant changes except the added stress of the DfSI project during those eight weeks. Thus, from the second hypothesis the conclusion drawn is that working on the DfSI project was one of the primary causes for stress leading to the change in HRV during the eight weeks of the project.

3. As mentioned earlier, a person's sensitivity to stress should remain constant to external stressors, but such ability to deal with stress should improve with the practice of AbMT intervention and should degenerate with chronic prolonged stress (Sgoifo et al., 2003). The study was expected to reveal if meditators have undertaken the practice of AbMT intervention effectively proving the third hypothesis of the quantitative analysis (Section 5.3.3-3). Thus, the response to psycho-physiological stress should be different for meditators and non-meditators. Findings from the study of the second hypothesis, indicated that all participants showed an increase in physiological stress due to project-work. But the meditators showed a better response to the stress-inducing tests than non-meditators after six weeks of practice of the AbMT intervention. As the meditators and the non-meditators faced the same prolonged stress of working on their DfSI project for eight weeks, the improved ability of meditators to deal with psycho-physiological stressor indicates that they have effectively practiced the AbMT intervention.
4. During this research, hypothesis 3b (Section 5.3.3-4) showed that ability to deal with physiological stress (calculated using change in HRV scores in response to a controlled stressor) is correlated to the corresponding change in dispositional awareness (calculated using the psychology-based MAAS questionnaire). This has been proven with a certainty of more than 99% ($p$value<0.01) for the given dataset. It appears that as the ability to deal with stress improves, the corresponding

psychological disposition also improves, which depicts the relationship between physiology and psychology of a person. As seen in the earlier point, physiological ability to deal with stress is improved with practice of AbMT intervention and such improvement can now be associated with corresponding improvement of psychological state in terms of attention and dispositional awareness. Improvements in attention and dispositional awareness, calculated using the MAAS questionnaire, have also been shown to successfully develop implicit and explicit mental activities, cognitive abilities and emotional responses (Brown and Ryan, 2003; Van dam et. al., 2010; Gregório and Pinto-Gouveia, 2013). Similarly, the change in physiological stress has also been associated with cognitive function and decision-making (Kofman et al., 2006; Cerutti et al., 2006). Thus, the literature relates physiological and psychological change to a corresponding behavioural change. Therefore, it is essential to understand the changes in behaviour of the participants through qualitative analysis of their teamwork during their DfSI project.

8.3 Comparing findings from the qualitative analysis of teamwork during DfSI projects by teams A, B and C

Chapter 6 demonstrated how the qualitative data has been divided based on different themes of investigation, and how the process analysis has been conducted. The thematic analysis revealed the arguments made by the participants while reflecting on their teamwork during their DfSI projects, followed by an understanding of the context for these arguments using Valkenburg and Dorst's (1998) explanation of design activities and an understanding the inner value system of the team by applying the proposed model of inner values. The analysis is expected to provide a possible rationale for the behaviour of the team during the DfSI project. The sections below discuss and compare the teamwork during the projects using the findings from the qualitative analysis on the five themes of investigation (section 7.3). These themes of investigation are; the effect of the multidisciplinary nature of the team, the effect of strength and ability to apply knowledge, the effect of leadership within the team, the effect of input from the sponsor and the effect of input from the community members and stakeholders.

8.3.1 Theme 1: The effect of Multidisciplinary nature of the team

Findings from the qualitative analysis of theme A for the three teams are discussed below (from pages 222 to 228). These findings are drawn from qualitative analysis on data from all three teams which has been presented in Appendix 1 sub-section 1.1 from page 1 to page 51.

8.3.1.1 Team A (for data analysis click here)

The quantitative analysis confirmed that all the members of Team A effectively practiced the AbMT intervention for eight weeks. During these weeks, the team members explained that they shared a plan and a vision for their DfSI project by investing time and effort in 'framing' activities during the initial weeks of their project (See argument 1/A-3.2). Such common 'frames' created trust within the team members (See argument 1/A-5.2), which led to open and honest communication within the team (See argument 1/A-3.21). Dorst (2011) explains the importance of 'framing' activity and calls it the "*core of design practice*" (p. 527). During the project by team A, common frames enabled effective 'moving' and 'reflecting' activities such as ideation and discussion of ideas (See argument 1/A-3.1), resolving inter-personal issues (See argument 1/A-3.26) and 're-framing' activities such as re-allocation of responsibility and monitoring each other's progress in a positive manner by providing

deadlines and feedback (See argument 1/A-10.2). Such 'reflecting' activities aided in personal professional development for some team members, for better performance in future work places (See argument 1/A-10.1). Schön (1983) explained the importance of such 'reflection in action' for the growth of professional practice. Team members experience of professional growth during their DfSI project was indicated by the explanations they provided in the study.

Dorst (2011, p.527) explains that "*framing can be a simple, routine, lightning-quick process within design practice if the problem situation is familiar, and if the designer has dealt with such matters before… a frame will be an integral part of the way the designer is 'reading' the situation*". However, all the participants selected for this research were novice-level design practitioners (Lawson and Dorst, 2009) where the designer does not have set frames. Therefore, members of team A may not have had existing frames and they had to spend an extensive amount of time and effort on developing common 'frames' to be able to deal with the multidisciplinary nature of their team. This was, at times, considered stressful by some of the members of the team (See Argument 1/A-1.3), because such activities were considered to be causing delays to subsequent 'moving' activities (See Argument 1/A-12.4). At times, this led to impatience where stronger personalities rather than those with stronger skill-sets took the initiative during tasks (See Argument 1/A-12.1). Although this did not affect design outcomes of the DfSI project, it was not considered ideal teamwork by one of the team members (See Argument 1/A-12.5). Lawson and Dorst (2013, p. 69) explain different personality characteristics of designers will lead to differences in the design process and practice. They explain Hudson's test (1966) and explain pure convention-based thinking within teamwork should not be expected and should remain an evolving feature during design projects. Team A appears to have evolved and showed certain inner values.

The different arguments derived from members of team A reveal that the team relied on trust and open communication for the effective use of diversity within their multi-disciplinary team. Thus, the team members revealed the inner value of 'Hopefulness for co-operation' (Q3.1, Q3.2, Q 3.21, Q3.26, Q5.2, Q10.2 and Q12.1) and 'Acceptance of the situation' (Q3.2, Q 3.21, Q3.26, Q1.3, Q1.4, Q12.1 and Q10.2). However, delays during teamwork by team A can be said to reveal a lack of 'Beginner's mind' (also referred to as an open-mind by expert design practitioners) (Q1.3, Q12.1, Q12.4) and the team may have also lacked the inner value of 'Patience' (Q1.3, Q12.1, Q12.4) when initiatives were not taken by members with the

strongest skill-set during some tasks of the DfSI project. Illustration of inner values for team A is shown in figure 8.1.

Thus, the members of team A reflected on the multidisciplinary nature of their team and seem to focus primarily on the advantages and disadvantages around 'framing' activities conducted by their team during the initial stages of their DfSI project and on and 'reflecting' activities throughout the project. The team expressed effective use of the diversity during the 'moving', 'reflecting' and 're-framing' activities because of the initial 'framing' activity. Thus, they seem to agree that such 'framing' and 'reflecting' activities, though challenging and time consuming, had an overall positive effect on their teamwork during the DfSI project.

8.3.1.2 Team B (for data analysis click here)

The quantitative analysis confirmed that all the members of team B were non-meditators. The qualitative data shows that team B could not communicate effectively during 'naming', 'framing' and 'moving' activities as the suggestions from some members were not considered to be relevant by the other members of the team (See Argument 1/B-2.4). This may have been because such members did not consider every discipline to be useful during the DfSI project (See Argument 1/B-6.1). This point of view led to inter-personal problems and an unequal distribution of workload within the members of team B (See Argument 1/B-6.10). Brown (2009) talks about 'analysis and synthesis' and recognizes the need for "*creating choices and then* (and only then) *making choices*". Even Osborne (2008) warned that discouragement can "nip creativity in the bud". The qualitative analysis of the reflections from members of team B reveal that their team had pre-conceptions about other disciplines, which led to decisions before effectively evaluating possible options for utilising the multidisciplinary aspect of their team. Further, the members of team B considered that their teamwork was negatively affected because of the multidisciplinary nature of their team, as it led to inter-personal problems, prolonged debates and the need to defend one's own viewpoints during different activities of the DfSI project (See Argument1/B-11.1). Nemeth (2012) explained that discussions are useful for breeding and developing creativity but insists that such discussions need to be productive (breaking down for building up). Uzzi (2007) also showed that though differences of opinion are useful, too much difference may not be productive for teamwork. This research can be said to show that, this was the case with team B and has been used to interpret the inner value system of team B during their teamwork.

The team revealed many negative aspects with regard to multi-disciplinary teamwork and therefore the inner values are said to be lacking in the team. The members of team B harboured pre-conceptions about other disciplines, which reveal, 'lack of beginner's mind' and 'judgemental' behaviour. Because of such attitudes, the members did not co-operate effectively with each other, which can be interpreted as, 'lack of hopefulness for co-operation', and they did not share the workload effectively leading to resentment, interpreted as, 'lack of generosity of spirit'. The teamwork was also affected by such attitude towards multidisciplinary teamwork because the team may have, 'lacked acceptance of situations' and 'lacked forgiveness' towards each other.

Thus, the members of team B reflected primarily on the disadvantages of the multidisciplinary nature of their team and focused on its different causes of inter-personal problems. The data shows that, 'lack of a common frame', led the team to disagree on a common understanding of the project and that 'differences in frames' for members from different disciplines led to inter-personal problems which hindered 'reflective' activities of team discussions, where team members had to defend their views as other members did not accept their contribution to be relevant during the DfSI project. Thus, teamwork by team B was negatively affected due to the multi-disciplinary nature of their team during; 'naming', 'framing' and 'moving' activities of their DfSI project causing hindrance to 'reflective' activity undertaken during the project with regard to the multidisciplinary nature of their team.

8.3.1.3 Team C (for data analysis click here)

Team C had a mix of meditators and non-meditators as revealed by the quantitative analysis. The analysis shows that the multidisciplinary nature of the team was beneficial to teamwork during the DfSI project by team C, because members had different skills which were useful at different stages of the project (See Argument 1/C-4.1.2 and Argument 1/C-7.3). The multidisciplinary members not only helped the project but also helped each other to balance their disciplinary strengths and weaknesses during various 'framing' and 'moving' activities by their team during the project (See Argument 1/C-7.1.1). Dorst and Cross (2001) explain that multiple disciplines are required for different tasks during team design and Sanders and Stappers (2008) also explain how multiple disciplines can become useful during different stages of the design process. The reflections from members of team C show that this was the case with their teamwork. Further, the members from other disciplines not only contributed to

the design activities, but also helped mediate and resolve friction within members of the same discipline within their team, which shows ‘reflecting’ activity (See Argument 1/C-7.1.1).

There was friction between the designers in team C, because they had the same skill-set and wanted to contribute to the same tasks during some of the ‘moving’ activity of the DfSI project. However, the team overcame the interpersonal and creative differences between members of the same discipline because of the interjection and mediation by members of other disciplines (See Argument 1/C-7.1.2). Such friction may have occurred due to differences in personalities, in addition to the similarity in abilities of the designers in team C (See Argument 1/C-9.1). Lawson and Dorst (2013, p. 69) explain that different personality characteristics of designers affect the way they apply the design process but not many authors have addressed problems arising in teamwork due to similarities of skill-sets and this needs to be noted for future research.

While understanding the inner value system of team C, the team showed, ‘hopefulness for co-operation’ (Q4.1.2, Q7.1.1, Q 7.3) because they accepted input from members of other disciplines during teamwork for different stages of their DfSI project. The members of different disciplines accepted each other’s opinions to enhance their own performance, which reveals, ‘beginner’s mind’ (Q9.1) or an open mind toward other disciplines. But, members of the same discipline did not always work efficiently together during a few ‘moving’ activities, which can be said to show, ‘lack of generosity of spirit’ (Q7.1.1) during some parts of teamwork during the project. However, this situation was resolved through mediation by the other members of their team, which shows ‘acceptance’ (Q7.1.2, Q9.1) as an inner value of the team.

Thus, the members of team C reflected primarily on the advantages of the multidisciplinary nature of the team during ‘moving’ activities and some ‘framing’ and ‘reflecting’ activities of their DfSI project. Members from different disciplines were helpful in various ways. Their different strengths were applicable at different stages of the project and aided the strengths of the other team members. The team seems to believe that having the same skill-set led to some friction between the designers but having members from other disciplines brought a different perspective, which helped resolve inter-personal problems and creative differences.

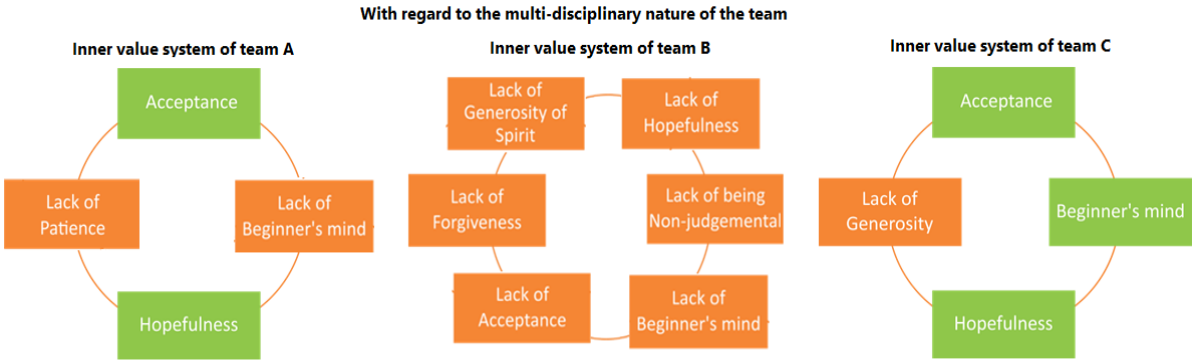
8.3.1.4 Summary

All the teams faced problems while working in the multi-disciplinary environment. While team A used a 'framing' and 'reflecting' activities to create and maintain a common frame towards the project, they lost a significant amount of time but gained an experience, which led to the development of their personal professional practice. Similarly, even though team C did not indulge in similar 'framing' activities, the team worked well during 'moving' activities with members of different disciplines contributing at different stages of the DfSI project. However, this became a hindrance when members of the same discipline wanted to contribute to the same task because they had the same skills and members of other disciplines could recognise this problem through 'reflecting' activities and addressed it quickly. On the other hand, members of team B described a negative experience with regard to working with other disciplines, because views from disciplines other than design were not considered to be relevant and this attitude was in-turn considered unacceptable by other members of the team. Inter-personal problems arose during teamwork by team C due to the multidisciplinary nature of the team which hindered 'framing', 'moving' and 'reflecting' activities. Thus, the above discussion reveals a picture of teamwork by teams A, B and C, and the rising commonality appears to be:

All teams faced problems while working in the multidisciplinary settings but, the teams with meditators, teams A and C respectively, seem to have more effective 'framing' and 'reflecting' activities to handle the multidisciplinary nature of their teams during the DfSI projects. This was not the case with team B, made up of all non-meditators, the multidisciplinary nature of their team led to hindrances during teamwork. However, it cannot be conclusively asserted that the differences in teamwork by meditators and non-meditators were the outcome of the practice of the AbMT intervention alone, though the intervention was one of the major differences between the teams.

Based on the above description, figure 8.1 can be said to provide visualisation of the inner values system of the teams which may have influenced their behaviour regarding working in multidisciplinary setting.

Figure 8.1: Inner value systems with regard to theme 1-Multidisciplinary nature of the team



8.3.2 Theme 2: The effect of strength and the ability to apply knowledge

This subsection discusses findings from the qualitative analysis of teamwork by the three teams with regard to their strength and ability to apply knowledge (pages 229 to 234). These findings are drawn from qualitative analysis which is presented in Appendix 1 sub-section 1.2 from page 52 to page 81.

8.3.2.1 Team A (for data analysis click here)

Team A, with all meditators, believed that knowledge from members of different disciplines helped the team to build each other's skill set and enhance each other's input during their DfSI project. Such knowledge appears to have improved teamwork because the strengths of one discipline covered the weaknesses of other during different stages of the project (See Argument 2/A-3.1). Further, team A conducted regular 'framing', 'reflecting' and 're-framing' activities, which made the team members aware of their strengths, weaknesses and responsibilities, individually and as a team and helped them to apply these effectively during teamwork. This knowledge was a source of motivation during the 'moving' activities of the project. During these activities, members of team A worked harder, smarter and to a deadline, for the betterment of the team and the project (See Argument 2/A-3.18). Valkenburg and Dorst (1998) explained the importance of 'framing' and 'reflecting' activities during team-based design. The data can be said to show that team A used 'framing' and 'reflecting' activities not only for designing solutions but also for managing how the different team members would contribute to the DfSI project.

The members of team A believed that knowledge and understanding of the project was important for being able to contribute any skill set (See Argument 2/A-1.7). When one of the members of team A could not figure out how or what to contribute during the 'moving' activities of the DfSI project, the other members of the team believed that a lack of knowledge, skill or understanding of the project may have been the reason (See Argument 2/A-1.7). This affected teamwork because other members of the team had to assign tasks to this member and this distracted them from their own tasks (See Argument 2/A-1). However, the team assisted this team member. Cross (2011) explains that building knowledge as a team is the responsibility of every member and it is up to the team members to help each other to do so. This is evident in the approach taken by team A.

The inner value system of team A represented their teamwork during their DfSI project. The members shared knowledge with each other, which enhanced their individual and team contributions to the project. This showed the inner value of, 'hopefulness for co-operation' within the team (Q3.1). The team members put the team's requirements above their own needs and this shows that the team may have had the inner value of, 'generosity of spirit' (Q3.18). This pertains to team members putting extra efforts to overcome their own shortcomings during 'moving' activities. Such perseverance of team members shows that they had the inner value of, 'patience' (Q3.18). Many members of the team mention that they could not accept the lack of knowledge of one of the team members as it distracted them from their own tasks, which can be said to depict a lack of the inner value of, 'acceptance of the situation' (Q5.4). However, the team did assist the member and exchanged disciplinary knowledge effectively which re-confirms the generosity of spirit of the team.

Thus, strength and ability to apply knowledge was essential to the teamwork of team A during their DfSI project. The team members primarily focused on 'moving', 'reflecting' and 're-framing' activities when referring to their ability to apply knowledge during the project. When the team members could apply their disciplinary knowledge they enhanced each other's contributions to the project. On the other hand, a lack of ability to apply knowledge was perceived as a hindrance, but the team helped each other to overcome it. The strength and ability to apply disciplinary knowledge was enhanced due to 'framing' activities which in-turn provided motivation and structure to the 'moving' and 'reflecting' activities that followed during their teamwork.

8.3.2.2 Team B (for data analysis click here)

Team B, with all non-meditators, had certain members who did not consider other's opinions to be relevant during teamwork for the DfSI project. Because of such non-inclusivity which has been considered as the lack of 'reflecting' activity, the solutions proposed by the team were not built on input from all the members of the team and led to poorly thought-out ideas and concepts during 'moving' activities by the team (See argument 2/B-2.22). Further, some team members explained that a lack of knowledge and lack of ability or enthusiasm to apply knowledge led to uneven distribution of workload between team members (See Argument 2/B-6.17) and led to a negative effect on certain members of the team, who had to then assign tasks to re-distribute work but were unsuccessful in doing so (See Argument 2/B-6.16 and see Argument 2/B-11.27). The literature review showed that, it is necessary for team members to

help each other to develop knowledge around the problem and the context and develop ideas that can lead to solutions (Lawson, 2006, p.292). If team members can contribute to each other's understanding of such co-evolving problem spaces and solution spaces (Dorst and Cross, 2001, p. 436) and have collaborative working (Dorst and Cross, 2001), then outcomes will be co-owned and have a better chance of being robust (Sanders and Stappers, 2008). This can be said to be missing during DfSI project by team B, where members could not contribute to each others' understanding during their DfSI project. Consequently, it can be seen that outcomes, ideas and solutions were not well thought out.

The inner value system of team B with regard to the strength and ability to apply knowledge was based on the interpretation of the reflections provided members of the team. Certain members of team B appeared to be judgemental (Q2.22, Q6.17, Q11.27) toward the strength of the contributions from other members. They believed that contributions from members of certain disciplines were not relevant, which can be interpreted as a lack of, 'beginner's mind' (Q6.16) and not including other's contributions demonstrates 'lack of hopefulness for co-operation' (Q2.22). When team members could not contribute or when their contributions were not considered to be useful, it led to distress, which showed, 'lack of acceptance of the situation' (Q2.22, Q6.16, Q6.17, Q11.27) and such distress led to inter-personal problems, which revealed, 'lack of forgiveness' (Q2.22, Q6.16, Q6.17, Q11.27) in members of the team. However, some of the team mentioned taking on an extra workload compared to other members, which shows that the team may have exhibited the inner value of, 'generosity of spirit'.

Thus, members of team B primarily focused on the disadvantages of a lack of knowledge within their team. It is unclear if some of the members actually lacked knowledge or if the other members just considered these members to not have relevant knowledge. However, non-inclusivity became a problem for both the ignorers and the ignored members of team B which hindered 'reflecting' activities. Therefore, all the members were dissatisfied with the knowledge that was collectively applied, which affected their teamwork, their outcomes and their inter-personal relationships. The effect of this scenario on the 'moving' activity can be said to be pertinent where the workload was distributed unevenly, the ideas generated were not well thought out and there was overall displeasure within the team during the DfSI project.

8.3.2.3 Team C(for data analysis click here)

Members of Team C, both meditators and non-meditators, applied their knowledge at different stages of the project, sharing the responsibilities where appropriate (See Argument 2/C-7.3). Different members became enthusiastic at different stages of the project to keep it moving forward (See Argument 2/C-4.29). The context of these contributions involved, 'framing' 'moving' and 'reflecting' activities. On the other hand, one of the members lacked enthusiasm to apply knowledge and did not contribute as much time and effort as other members of the team (See Argument 2/C-4.28). Another member of team C lacked the ability to apply knowledge (See Argument 2/C-7.12), which hindered teamwork because other members had to assign tasks to this member. However, team C overcame these hurdles and helped each other during the DfSI project.

The inner value system for team C depicted their teamwork with regard to their ability to share and apply knowledge. Hopefulness (Q7.3, Q4.29) that every team member will contribute was considered important to initiate an exchange of strengths of knowledge by team C. When certain members could not apply their knowledge, the team worked toward inclusion of such members into the teamwork by going out of their own way. This shows the inner value of, 'generosity of spirit' (Q4.28) by the team. Some of the team members did not think about work in terms of it being good or bad, which shows, 'non-judgemental attitude' (Q4.28) and accepted the situation to help their team members to contribute to the project, which shows that the team had the inner value of, 'acceptance of the situation' (Q7.3).

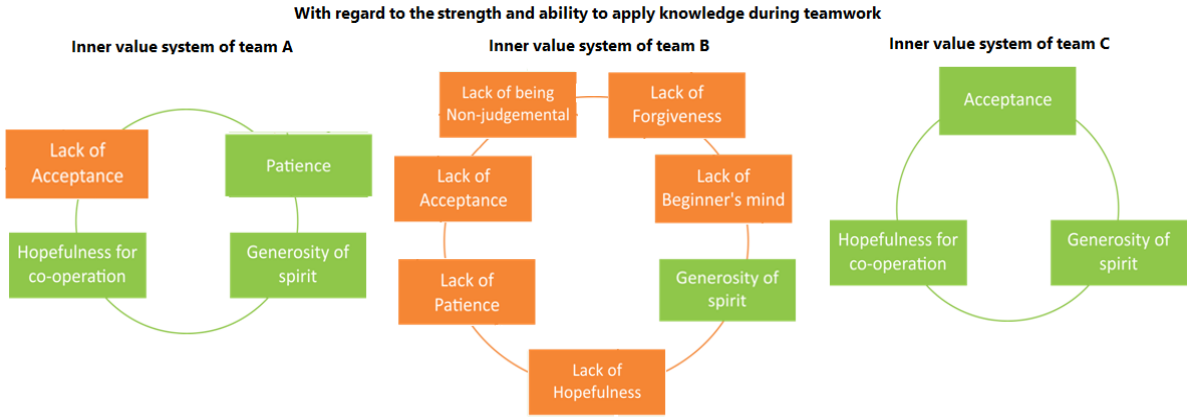
8.3.2.4 Summary

Thus, teams with meditators (teams A and C) demonstrated strength and ability to apply knowledge and build knowledge together as a team. They shared knowledge and overcame problems stemming from a lack of ability by helping fellow team members. While team A used 'framing' and 'reflecting' as a way to build common knowledge, team C shared different knowledge at different stages of the project which is primarily 'moving' activity. On the other hand, the members of team B, who were all non-meditators, could not apply their knowledge effectively due to different reasons that could be interpreted as lack of 'reflecting' activities in the team. This led to problems like the workload being unevenly distributed; certain members feeling that they were being ignored while others felt overwhelmed and the outcomes created by the team were eventually affected because they were not well thought-out. Thus, it can be said that:

Every team faces the problem of a lack of strength and ability to apply knowledge from one or more members of the team during the DfSI project. However, teams A and C with meditators, overcame such hurdles by helping each other. While team A used 'framing' and 'reflecting' activities, team C used 'moving' activities during their DfSI projects. Team B, with all non-meditators, could not do so effectively due to lack of 'reflecting' activities. The relationship between the practice of AbMT intervention and building strength and ability to apply knowledge cannot be conclusively asserted from the data, though the intervention is one of the major differences between these teams.

Based on the above description, figure 8.2 can be said to provide visualisation of the inner values system of the teams which may have influenced their behaviour regarding the strength of knowledge of their team and the ability to use such knowledge in effective and meaningful manner.

Figure 8.2: Inner values with regard to theme 2- strength and ability to apply knowledge



It can be noted that the findings on theme 1 and 2 are similar and inter-related. On one hand team A and C explain how the multiple disciplines added to the collective knowledge of the team and applied individual knowledge at different phases of the DfSI project, members of team B explained that the multiple disciplines added to the complexity of their DfSI project where knowledge sharing became increasingly difficult. The reasoning for such performance by these teams is also same as understood from the two themes. However, the role of the practice of AbMT intervention to improve the ability to work in multi-disciplinary settings

and to share knowledge during teamwork has not been explicitly expressed in the data. Thus, the conclusions drawn from the two themes above could be combined and it can be said that,

Every team faced problems while working in the multi-disciplinary setting of their teams (section 8.3.1) and with regard to the strength and ability to apply knowledge (section 8.3.2). The team with meditators (teams A and C) had more effective 'framing' and 'reflecting' activities to handle the multi-disciplinary nature of the teams and share knowledge during their DfSI project, while team B, without meditators, did not manage to do so. However, it cannot be conclusively asserted that improved 'framing' and 'reflecting' activities were affected primarily because of the AbMT intervention, though the intervention was one of the major differences between the teams.

8.3.3 Theme 3: The effect of leadership within the team

This subsection discusses the findings from the qualitative analysis of teamwork by the three teams with regard to the leadership within the team (pages 235 to 241). These findings are drawn from qualitative analysis which is presented in Appendix 1 section 1.3 from page 82 to page 120.

8.3.3.1 Team A (for data analysis click here)

In team A, with all meditators, project planning was performed by one of the team members (See Argument 3/A-1.22). However, all members were involved in discussing and making decisions (See Argument 3/A-1.24). Such co-owned decisions within the team used the strengths of individual members to execute the plan (See Argument 3/A-3.17 and Argument 3/A-1.24). On the other hand, as the team members were not assigned formal leadership roles and responsibilities, the team had to contribute additional time and effort to organize themselves before they could approach the community (See Argument 3/A-12.6). While sharing such leadership roles, Team A's approach to management of their teamwork was explained in similar way by different members of the team. They said when the team could not reach consensus during discussions, the members moved towards short actions rather than prolonged unproductive discussions and then came back to reflect on these actions to reach decisions. This was difficult to do but the team members explained that the practice of meditative intervention helped the team to stay calm and be aware of their own choices, where they put the tasks and the needs of the team before their own ego (See Argument 3/A-10.4). Thus, using Valkenburg and Dorst's (1998) explanation of design activities, it can be interpreted that the team indulged in 'reflecting' activities to 're-frame' their future 'moving' activities. Dorst and Cross (2001) explain that collaborative work is essential to design process. Sanders and Stappers (2008) take this thought further and explain how co-owned decisions can lead to co-operative actions. What Sanders and Stappers (2008) talk about by mentioning participation, is not limited to working within team and they encourage the participation of stakeholders. Members of team A used a participatory approach and certain members mentioned that representing the team in front of community stakeholders was a source of motivation, which helped the team to perform better. The team defended views from community members in front of other community stakeholders and also in front of the client (sponsor) of the DfSI project (See Argument 3/A-12.20). However, while doing so, the size of the team was considered important and suitable size enabled sharing of roles and

responsibilities within the team members (See Argument 3/A-12.10). Thus, the above five instances (Arguments 3/A-1.22; 3/A-3.17, 3/A-1.24, 3/A-10.4 and 3/A-12.20) show that:

Members of Team A can be said to have adopted collaborative strategies to share the responsibilities pertaining to leadership of their team and resolved their differences co-ordially e.g. they chose action-reflection cycle over prolonged unproductive discussions, involved other team members and stakeholders etc. According to the members of the team, the practice of AbMT intervention played an important role in formulation and calm execution of such decisions.

Another aspect of leadership considered by members of team A, is the switching between the roles as a leader and a follower within the team. Both the roles were considered important by members of the team and therefore, while taking up either role, the team members experienced distress and anxiety about the other responsibilities they had. The switching of roles required switching between mind-sets, which was a struggle. Thus, using Valkenburg and Dorst's (1998) explanation of design activities, it appears that the members refer to the 'reflecting' activities meant for switching between roles during teamwork for DfSI project. They explain that meditation helped them to maintain focus while in a role and calmly switch from one role to another by focusing on what they were doing in the moment (See Argument 3/A-12.29.1). Kabat-Zinn (2003) explains how meditation aids contemplation of the 'self' by bringing the focus of the practitioner 'in the moment', which helps in relieving suffering (See explanation by Kabat-Zinn (2003) who explains pain as natural and often physical, as opposed to suffering, which is subjective and mental). The experience of the member of team A can said to be contemplative (beyond reflective) and can, therefore, be considered a validation of such a theoretical perspective arising from the review of literature. Thus, the reflection from participant (Argument 3/A-12.29.1 and Argument 3/A-10.4) shows that:

Members of team A shared leadership and handled multiple roles and responsibilities during teamwork within their DfSI project and they could switch calmly between such roles and carry out their responsibilities effectively and calmly, which may be credited to the practice of AbMT intervention which helped them focus 'in the moment'.

Enthusiasm and inclusiveness is required during teamwork for DfSI projects (Cross and Claburn-Cross, 1995; Stempfle and Badke-Schaub, 2002). Meditation practice helped the team "*come at it* (the project) *with fresh eyes*". This provided enthusiasm every morning for a few members of the team. Using the explanation of design activities by Valkenburg and Dorst (1998), members referred to 'reflecting' activities affecting the 'frame' of reference. However, as the day progressed, this enthusiasm decreased due to day-to-day activities and workload (See Argument 3/A-12.29.2). The literature on AbMT shows that meditation needs to create a perspective of experiencing everything as if for the first time (Greenberg, 2012; Kabat-Zinn, 2013). Such a perspective has been proven to be important for creative work in the team context (Uzzi, 2007). Thus, it can be said from the participant's reflection (Argument 3/A-12.29.2) that:

Some members of team A tried to keep an open mind with the help of AbMT intervention and temporarily attained a fresh perspective towards their DfSI project.

Before moving ahead, it is important to understand the inner value system that the team had while dealing with leadership during teamwork for their DfSI project. Team A had a non-judgemental attitude towards leadership because team members accepted a secondary role where necessary. Sharing of responsibilities, including leadership of the team, showed, 'generosity of spirit' (Q1.22, Q12.20, Q 10.4, 12.29.1) and 'hopefulness for co-operation' (Q12.20) within team A. When the members decided to apply an action-reflection cycle instead of prolonged discussions, the team members demonstrated, 'patience' (Q10.4, Q12.29.2) and 'acceptance of the situation' (Q1.24, Q12.29.1 and Q12.29.2).

Thus, the reflections from members of team A provide a valuable insight into the role that the practice of meditative intervention played on the activities perceived as leadership during teamwork for their DfSI project. Using the explanation by Valkenburg and Dorst (1998), the members of the team appear to be referring to 'reflecting' activities affecting their 'framing' and 'moving' activities at an individual and team level. Thus,

the teamwork during the DfSI project by team A can be said to have evolved due to AbMT intervention because members of the team believe that the AbMT intervention helped them in different ways,

- adopted collaborative strategies to share the responsibilities pertaining to leadership of their team by involving other team members and stakeholders,
- conducting deliberations cordially and practically to put needs of team before their own ego,
- managing personal responsibilities calmly y picking up and letting go leadership as required and
- keeping an open mind to get fresh perspective about the DfSI project.

8.3.3.2 Team B (for data analysis click here)

Certain members of team B took the initiative in planning their own activities and tried to update and involve other members of their team in planning activities for the team. However, the discussions during planning turned into counterproductive arguments (See argument 3/B-11.23). Some team members thought it necessary to provide leadership by assigning tasks and roles to other members of the team (See arguments argument 3/B-6.20 and argument 3/B-11.2). This was perceived by the other members of the team as dictating rather than discussing responsibilities during teamwork (See argument 3/B-2.5, argument 3/B-2.6 and argument 3/B-2.21). The members recognized that a lack of leadership and planning within team B led to an uneven workload between team members and prolonged discussions and inter-personal problems, which adversely affected their teamwork during the project (See argument 3/B-6.20 and argument 3/B-11.2). Using the explanation of design activities by Valkenburg and Dorst (1998), the members of team B referred to unsuccessful 'framing' activities, leading to problems during 'moving' activities. Scharmer (2010, p.2) brings to light "*the challenge of missing collective leadership",* which can lead to project decisions not being co-owned and team members having to defend their decisions and becoming ego-centric. Whitley (1993, p. 94-97) also examined the problem of multiple intentions affecting social development projects and recognised that it is the designers' responsibility to guide others involved in the project through proper leadership. Team B lacked such collective leadership and this reveals the problems predicted by literature to have occurred during their teamwork.

What inner value system with regard to leadership could have affected teamwork during the DfSI project by team B? Team B lacked, 'hopefulness for co-operation' (Q2.21, Q2.6) and the inner value of, 'patience' (Q11.2, Q6.20) when the team members did not share

leadership effectively and instead dictated roles and responsibilities to each other. The members were, 'judgemental' (Q11.2, Q6.20, Q2.21, Q11.23), lacking, 'forgiveness' (Q2.5) and 'acceptance of the situation' (Q11.2, Q6.20, Q2.5, Q2.21 andQ11.23) during decision making perceived as leadership during teamwork.

Thus, the members of team B agree that leadership in the team was not shared and tasks had to be assigned. The participants explained that this happened throughout the project, which using Valkenburg and Dorst's (1998) explanation refers to, 'naming', 'framing', 'moving' and 'reflecting' activities during the DfSI project. While some members believe assigning roles and responsibilities was a necessity, other members found this unacceptable. The principles of leadership of Team B are unclear. What is evident is that two extreme opinions on decision-making, leadership and management for the DfSI project existed in team B. One opinion believed that roles and tasks had to be assigned to others, the other considered such leadership fiercely unacceptable. Such opposing 'frames' of reference toward project planning and management, perceived by the team as leadership, was clearly the breeding ground for resentment and conflict within team B during 'moving' activities.

8.3.3.3 Team C (for data analysis click here)

In team C, with both meditators and non-meditators, leadership was shared and members took the lead, as necessary, to support their team (See argument 3/C-4.2),by keeping the focus of the team on tasks and by managing time flexibly (suited to individual member) (argument 3/C-7.13). During the activities perceived as leadership, the member of team C who practiced AbMT intervention explained that meditation helped her to reflect on her own behaviour and act cordially with other members of the team rather than reacting to situations (See argument 3/C-4.25). As discussed earlier, Kabat-Zinn (2003) explains how meditation aids to bring the focus of the practitioner 'in the moment' and this aids in re-focusing the mind and actions. Such experience have also been explained by the members of team A, who were all meditators, when they explain they gained a fresh perspective (See argument 3/A-12.29.2). Thus, it can be said that:

Some meditators may have been able to reflect on her own behaviour and act cordially rather than reacting due to the practice of AbMT meditation.

The inner value system of the team towards the idea of leadership during teamwork is explained below. Team C members shared leadership when required, which reveals, 'a non-judgemental attitude' (Q7.13) and a 'generosity of spirit' (Q4.2, Q7.13). Meditation may have helped the practitioner member of the team to reflect on her own actions, which can be said to reveal a 'beginner's mind' (Q4.25), and to act empathically with other members of the team, which can be interpreted as the inner value of, 'patience' (Q4.25).

Thus, the team members shared responsibilities of planning, decision-making and execution of tasks. Sometimes decisions needed to be made and one of the members would step up as leader to help the team make it. The team's management strategy was strict but flexible, and focused on prioritising things that were deemed important. The leadership was cordial, which may be because the member practicing AbMT intervention could reflect and modify her own behaviour and actions for better teamwork during the project. The leadership changes spanned the entire project and by using Valkenburg and Dorst's (1998) explanation of design activities, , the members can be said to refer to 'naming', 'framing', 'moving' and 'reflecting' activities when they described shared leadership by team C.

8.3.3.4 Summary

Teams with meditators (teams A and C) shared leadership and mention that meditation helped during different aspects of what they considered to be leadership of their team. On the other hand, team B with all non-meditators tried to take a leadership role rather than sharing it with other members of their team, which became counter-productive and grounds for inter-personal conflicts. Key observations have been highlighted (using boxes) in the discussion above because they provided instances where effect of AbMT intervention was more apparent and clear to the participants while they reflected on their teamwork. With the eight instances as evidences, it can be said that,

Teamwork during the DfSI project appeared to have evolved due to the practice of the AbMT intervention because (section 8.3.3), members of the team mention that AbMT practice played a role in helping them and their team to

a. share the responsibilities pertaining to leadership of their team not only with other members of their team but with wider community of stakeholders (Arguments 3/A-1.22; 3/A-3.17, 3/A-1.24, 3/A-10.4 and 3/A-12.20),
b. resolve disagreements cordially and practically so that needs of team were given

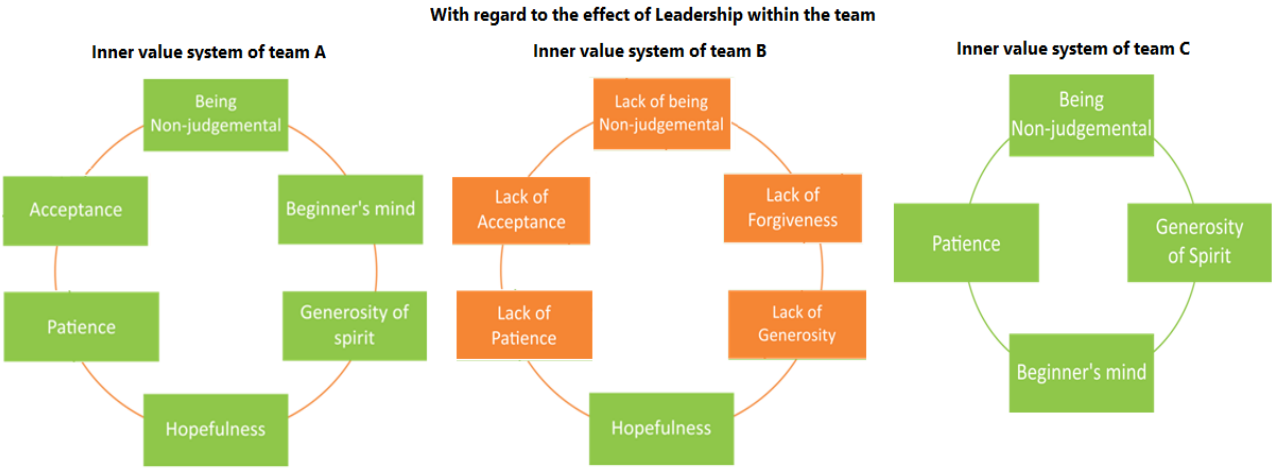
importance over personal ego (Arguments 3/A-1.24 and 3/A-10.4),

c. manage personal responsibilities calmly as leader and follower within the team (Argument 3/A-12.29.1 and 3/A-10.4) and

d. keep an open mind to gain fresh perspective through reflective activity (Argument 3/A-12.29.2 and Argument 3/C-4.25).

Based on the above description, figure 8.5 can be said to provide visualisation of the inner values system of the teams which may have influenced their behaviour regarding leadership of their teams.

Figure 8.3: Inner values with regard to theme 3- leadership within the team



8.3.4 Theme 4: Effect of input from the sponsor (client)

This subsection discusses the findings from the qualitative analysis of the effect of input from sponsors of the DfSI projects on the teamwork by the three teams (pages 242 to 246). These findings are drawn from qualitative analysis which is presented in Appendix 1 section 1.4 from page 121 to page 154.

8.3.4.1 Team A (for data analysis click here)

Members of team A explained that critically assessed feedback, both positive and negative, from the client, was important to their teamwork because it gave direction to the project, which in-turn changed the attitude of the team toward the project and motivated them (See argument1.11 and argument12.12). It was not just the content but also the way in which the client explained the feedback that encouraged the team (See argument 4/A-1.13 and argument 4/A-5.10). Client's (sponsor) input became part of 'naming' activities, which, according to the explanation from Valkenburg and Dorst (1998), is the activity of understanding the project brief. Feedback from the client was considered important because the team may have become overly influenced by input from the community stakeholders. The client (sponsor) reminded the team of the practical aspects such as financial viability. Such 'naming' activities did not require new 'frames' because the team already had all the information that they required (See argument 4/A-3.7). The feedback from the client led to new 'moving' activities and also some 'reflecting' activities within the team. The 'reflecting' activities can be seen when the team accepted that they had become overly influenced by input from the community and though their initial thought was that, early input from the client could have saved their time and effort, but later the team reflected and realised that they should have considered the practical aspects themselves. They took the responsibility for the shortcomings of the solutions they had proposed. This may have helped the team to move past the incidence and focus on the final outcomes with a positive attitude (See argument 4/A-1.12, argument 4/A-3.8, argument 4/A-5.9, argument 4/A-10.11 and argument 4/A-12.11). Whitley (1993, p. 94-97) examined this problem of multiple intentions affecting social development projects and recognised that it is the designer's or the design team's responsibility to guide others involved in the project. The team took the responsibility of managing multiple intentions and thus their actions can be said to be in line with the theory understood from literature.

The inner value system of team A was mostly positive. The team initially lacked the inner value of, 'acceptance of the situation' (Q1.10) when the client was not available to provide input/feedback. However, the team included their input into final solutions, which has been interpreted as the inner value of, 'beginner's mind' (12.12, Q5.10). The team decided to move past the lack of feedback and decided not to blame the client for the team getting distracted, which can be said to show the inner value of, 'acceptance' (Q1.11, Q12.12, Q1.13), 'forgiveness' (Q1.13,Q5.10) and 'being non-judgemental' (Q1.11, Q1.13).

Thus, the participants speculated that early feedback from the client would have been helpful. However, they also seem to be taking responsibility for waiting for feedback and not thinking the same things on their own. The members mostly reflect on the 'naming' activity, which was affected by input from the client (sponsor). The perception or 'frame' of the teamwork was influenced by the community stakeholders, until the sponsor's input brought the focus of the team to more practical aspects such as financial viability. The subsequent 'moving' activities which followed the client's input did not seem difficult to the team because they had created appropriate 'frames' for building solutions with input from community stakeholders.

8.3.4.2 Team B (for data analysis click here)

Members of team B experienced a lack of direction during teamwork for their DfSI project. The members of the team expressed that this lack of direction was because the clients (sponsors) were not available to provide input or specify direction for the project. The members also believe that this lack of direction led to disparity in the understanding of the project-requirements within their team, also in the strategy for the project that different team members proposed (See argument 4/B-6.6 and argument 4/B-11.10). Dorst and Cross (2001) recognise that collaborative work within design teams is important yet difficult specifically because, the co-evolving problem space and the solution space necessitates the team members to take different directions during problem framing, scoping and finding solutions (p. 436).

Thus, the differences in perceived direction for the project caused inter-personal problems within the members of team B (See argument 4/B-2.18). Such incidences affected the team's attitude during the interim examination, where the team members seemed to fixate on the delay in providing feedback and kept defending the reason for the direction their team had taken. However, the members of team B used the feedback from the client and found it to be

useful because it provided much-needed direction to their DfSI project. The team's fixation on the past delay by client to provide feedback can be said to have affected the teamwork during the DfSI project, because the members describe teamwork after the client's input as rushed and stressful, where the members worked individually rather than as a team because of inter-personal problems (See argument 4/B-11.11). Scharmer's leadership theory (2000) shows the importance of collective leadership within teams by working with open mind, open heart and open will[29]. Though the delay in input from client remains an important part of lack in understanding the requirements of the project, teamwork by members of team B can be said to face problems due to missing collective leadership within team.

The inner value system of team B needs to indicate the effect of client's input on their teamwork during the DfSI project. The team members believe that the client not being available was the leading cause for the problems that their team faced and this reveals that the team lacked the inner value of, 'forgiveness' (Q2.18, Q11.10) toward the client and lacked, 'acceptance of the situation' (Q2.18, Q6.6, and Q11.11). The team ended up integrating the input from their client (sponsor) despite their misgivings toward the late feedback and this shows, 'generosity of spirit' (Q2.18, Q6.6, and Q11.11).

Thus, the team believes that because the client was not available to provide clear understanding of the brief, which is the 'naming' activity, their team did not know which direction to take, which is the lack of an appropriate 'frame'. This led to intense discussions and development of inter-personal problems during 'naming', 'framing' and 'moving' activities. The experience of the team reveals that a consensus is required during different activities without which the team could not work together effectively and blamed their client as a source of such problems.

8.3.4.3 Team C (for data analysis click here)

Members of team C explained that input from their client was a source of motivation for the team (See argument 4/C-4.11). However, the client at times provided feedback, which was not clear or was not critical enough. This required the team to be innovative in gauging the

[29] Open mind is the capacity to suspend old habits of thought. Open heart is the capacity to empathize, to see a situation through the eyes of someone else. Open will is the capacity to let go of old ways of doing things and accept new ones. Scharmer (2010) calls this "*letting go and letting come*" achieved through simple steps of observe, retreat and reflect.

client's real response based on the level of excitement/enthusiasm towards an idea (See argument 4/C-4.13). This refers to a 'moving' activity of getting feedback from the client and then building a new 'frame' by 'reflecting' on their response. However, team C believed that a more critically assessed response from the client would have been helpful (See argument 4/C-7.20). Further, one of the key stakeholders, also considered as a client by the team, could not meet the entire team on a regular basis and one member took the initiative in visiting her. Other members believe that meeting this client as a team would have helped ideation activities during their DfSI project (See argument 4/C-9.4).

The inner value system of team C needs to represent the effect of client input on their teamwork. The team used innovative ways to reflect on and interpret client's feedback which shows the inner value of, 'being non-judgemental' (Q4.11, Q9.4), 'hopefulness for co-operation' (Q4.11, Q4.13, and Q7.20) and 'generosity of spirit' (Q4.13, Q9.4).

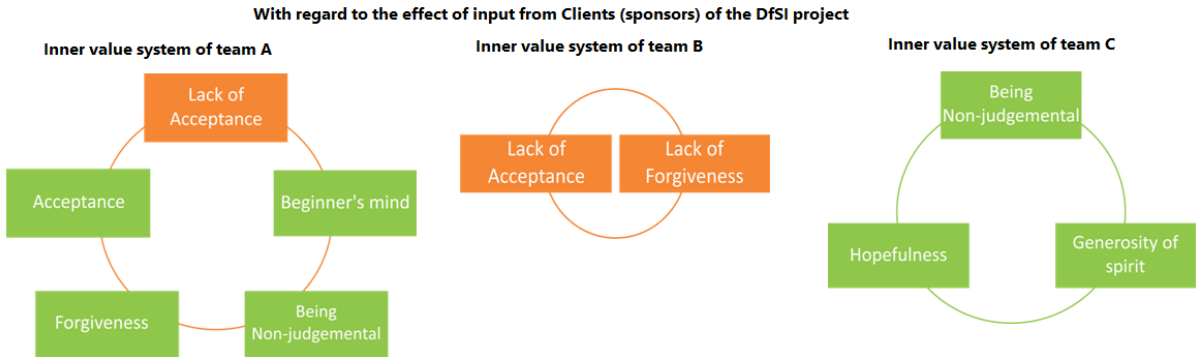
Thus, team C believed that 'naming', 'framing' and 'moving' activities were affected by input from the client. When the team could not assess the feedback from the client clearly, the participants utilised 'reflecting' activity to re-evaluate the client's feedback.

8.3.4.4 Summary

All the teams gave importance to the input from the sponsors of their project because the teams considered them to be the client. The teams were able to successfully inculcate the input from client/sponsor into the outcomes of their DfSI project. However, the attitude of teams with meditators (teams A and C) was forgiving and non-judgemental when dealing with their respective issues pertaining to the client's input. They can be said to have used 'reflecting' activities to deal with such issues. Whereas, the team with non-meditators (team B) blamed the client for their problems during the DfSI project.

Based on the above description, figure 8.7 shows the inner values recognised from the analysis of data on theme 4.

Figure 8.4: Inner values with regard to theme 4- effect of input from the client (sponsor) of the DfSI projects.



Thus, it can be said that:

Every team faced problems while getting useful input from the client (sponsor) of their DfSI project (section 8.3.4). The team with meditators (teams A and C) had a more effective attitude and used 'reflecting' activity during their projects to make effective use of inputs from client. However, it cannot be conclusively asserted that such a difference in attitude was an outcome of the AbMT intervention, though the intervention was one of the major differences between the teams.

8.3.5 Theme 5: The effect of input from the community stakeholders

This subsection discusses findings from the qualitative analysis of the effect of input from community stakeholders on the teamwork by the three teams (pages 247 to 251). These findings are drawn from qualitative analysis which is presented in Appendix 1 section 1.5 from page 155 to page 181.

8.3.5.1 Team A (for data analysis click here)

Team A recognised key stakeholders and community members and acquired their input during 'naming', 'framing' and 'moving' design activities, to create new ideas as outcomes of their DfSI project (See argument 5/A-1.16 and argument 5/A-3.11). Collecting information and input from community stakeholders was challenging, but the team gave importance to community and stakeholder involvement and participation as their method for creating social innovation (See argument 5/A-3.12). The team did not let negative responses from stakeholders in the community affect them (See argument 5/A-3.10) and persistently tried to create relationships, gather feedback (See argument 5/A-5.13) and resolve misunderstandings

(See argument 5/A-5.15). The literature review described how many authors acknowledge that user engagement, participation and user-centred approaches to design, can help in managing the complexity of co-evolving problem spaces and solution spaces during social innovation projects, by creating a common intention for collective innovation through the sharing of knowledge and skills (Dorst and Cross, 2001; Sanders and Stappers, 2008; McMillan, Wright and Beazley, 2004; Stacey, 1993; Cooke and Kothari, 2001). Team A appears to have put such theory into action.

During the course of community engagement, the team became overly influenced by inputs from the community stakeholders (See argument 5/A-12.19). The solutions the team proposed satisfied community requirements but did not remain practical or within scope of the project brief, until the sponsors brought this to the team's attention during the interim examination (See argument 5/A-1.15). However, community engagement remained a source of motivation for the team, and the team ultimately modified their proposals based on their project brief as well as input from the community, which remained an essential part of the final solution proposed by the team (See argument 5/A-10.13).

The inner value system of team A, as understood from such description of teamwork with regard to input from the community, can be said to show the inner value of, 'beginner's mind' (Q1.16) and 'hopefulness for co-operation' (Q1.16, Q3.11, Q3.12, Q5.15, Q1.18, Q3.10, Q10.13) because they gave importance to input from the community and built their actions accordingly. The team also showed the inner value of, acceptance of the situation (Q1.16, 3.12, Q1.15, Q1.18, Q3.10, Q 12.19), 'patience' (Q5.13, Q5.15) and 'forgiveness' (Q5.13) when the team persistently tried to overcome challenges of involving members and stakeholders from the community and ended with achieving community engagement into their project.

Thus, the team made an extra effort to involve community stakeholders in a participatory approach to their DfSI project. The involvement of community stakeholders in the 'naming', 'framing' and 'moving' activities affected their teamwork both positively and negatively. The positive effect on teamwork could be the better understanding of the problem space and the solution space and co-evolution of these spaces. The negative effect was that solution space emerged keeping community needs in mind while the team strayed from the practical aspects of their project brief, until the sponsors of their project brought this to their notice.

8.3.5.2 Team B (for data analysis click here)

Members of team B recognized essential stakeholders to be involved during their DfSI project (See argument 5/B-6.9). However, their contact with the community was limited because of the delays caused by inter-personal problems and a lack of planning on the part of the team (See argument 5/B-11.30). The team gathered some feedback on the solutions they had created for the community. Feedback from some of the community stakeholders such as local non-profit organisations and schools helped the team during 'reflecting' activities, to re-evaluate the solutions that they had proposed and this feedback was used for validation rather than the understanding of problems and ideation of solutions (See argument 5/B-6.8). Thus, input from the community had a limited influence on the solutions proposed by team B (See argument 5/B-2.24). The members of team B reflected that input from the community changed their perception or 'frame' and, to some extent, their understanding of the problem, which can be said to be a 'naming' activity. However, such input was collected too late and most of the essential 'moving' activities were not influenced by input from community. Dorst and Cross (2001) explain that the role of the community during social innovation project needs to start with understanding the problem and creating essential direction for ideas and solutions to emerge. But team B did not apply such an approach and their solutions did not lead to community participation.

The inner values of team B derive from the explanation of teamwork with regard to input from community stakeholders. Team B appear to have the inner value of, 'acceptance of the situation' (Q6.9, Q6.8) because they sought alternative ways to develop their understanding about the project when the team could not meet the community stakeholders, due to problems within their team. The team showed the inner value of, 'beginner's mind' (Q6.9) when integrating feedback from the community stakeholders, who reviewed their proposed solutions. However, the team also lost the inner value of, 'hopefulness for co-operation' (Q2.24, Q6.8, Q11.30) and may have lacked, 'forgiveness' (Q11.30) because they could not overcome internal problems for community engagement.

Thus, the team could not gather input from the community during 'naming', 'framing' and most of the 'moving' activities. This may be because members could not agree on a strategy and were delayed due to inter-personal conflict, which distracted the team. The members involved stakeholders from the community to review the ideas and solution they had created, which was a 'reflecting' activity, and helped the team to re-structure some of their earlier

assumptions and revise some of their solutions. However, as reported by team B, the community participation during their project can be said to be limited to reviewing ideas rather than understanding problem and generating solutions.

8.3.5.3 Team C(for data analysis click here)

Members of team C had input from community stakeholders throughout the project. Initial observation of the parking procedures followed by the community input, provided a better understanding of the project (See argument 5/C-9.8). The team then used community engagement and stakeholder engagement for understanding problems and creating solutions with the people that the team was designing for. However, the team could not gather feedback from community members after the ideas were refined by the team because feedback from stakeholders such as the client and the Parking department was given more importance (See argument 5/C-4.21). Thus, team C involved community members and stakeholders during 'naming', 'framing' and 'moving', but not 'reflecting' activities as understood using Valkenburg and Dorst's (1998) explanation of design activities.

The inner values of team C are derived from the explanation of teamwork. The team showed the inner value of, 'beginner's mind' (Q9.8) and 'hopefulness for co-operation' (Q4.21) because they employed community engagement heavily during their DfSI project.
Thus, team C can be said to utilise a participatory approach to involve community stakeholders in their 'naming', 'framing' and 'moving' activities.

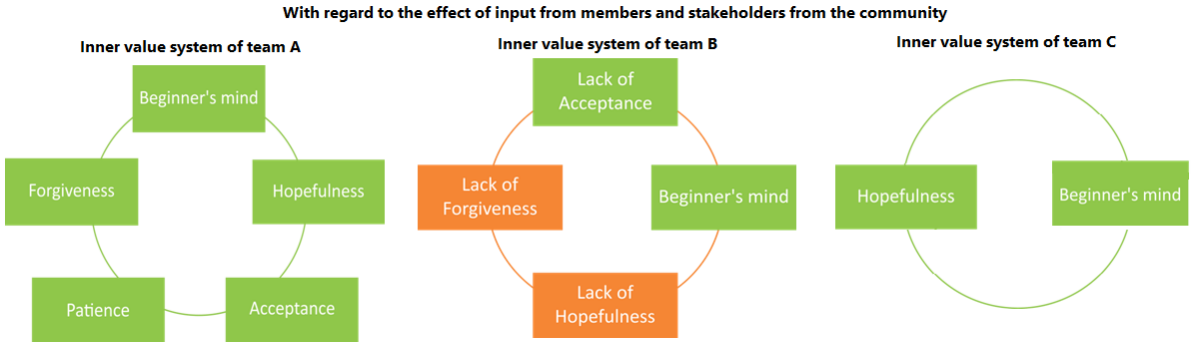
8.3.5.4 Summary

Teams A and C, both with meditators, were successful in involving community stakeholders and designed 'with' the end-users of the solutions being created. Their approach aided the co-evolution of the problem space and solution space, and an important outcome was true community participation during their DfSI projects. This involvement of community stakeholders during 'naming'. 'framing' and 'moving' activities is considered important because, review of Design literature shows that such community engagement is considered essential to building acceptance of solutions and legacy through Design. However, team A got overly influenced by the input from community until the client brought essential aspects to their notice. On the other hand, team B, with all non-meditators, could not involve community members and managed to gather only a few reflections from some of the community stakeholders. The solutions developed in this way, were considered as successful

design outcomes by the sponsors and MDI teachers. However, literature points out that such solutions have a lower chance of integration and acceptance by the community.

Based on the above description, figure 8.9 shows the inner values recognised from the analysis of data on theme 4.

Figure 8.5: Inner values with regard to theme 5- effect of input from members and stakeholders of the community.



Thus, it can be said that:

Each social innovation project benefited from obtaining input from community stakeholders. The teams all began with an inclination toward community involvement. However, the teams with meditators (teams A and C) employed participatory approaches to develop Design solutions 'with' the community stakeholders. Team A got overly influenced by inputs from the community stakeholders and temporarily lost focus of aspects such as financial viability, until the sponsors brought the team's attention back to these aspects. On the other hand, the team with non-meditators (team B) could not involve community stakeholders as much as they had hoped because of problems with planning and distractions due to internal problems within the team. Though the relationship between the practice of AbMT intervention and the effective inclusion of community stakeholders in the DfSI project could not be conclusively asserted, the intervention was one of the major differences between the teams.

8.4 Triangulation of Inter-disciplinary research

This research aimed to collect both qualitative and quantitative evidence and therefore it is important to create a triangulated understanding about the effects of AbMT intervention from the data analyses.

The analysis of quantitative data showed that the ability to deal with physiological stress correlates to changes in the psychological state of dispositional awareness. Further, the meditators show an improved capacity to deal with physiological stress, which non-meditators do not. Non-meditators in fact show a reduced ability to deal with physiological stress due to the day-to-day stress of DfSI project-work. The literature shows that physiological response to stress is related to cognitive function and decision making (Kofman *et al.* 2006; Cerutti *et al.* 2006). Literature also shows that improved attention and dispositional awareness are also related to implicit and explicit mental activities, cognitive abilities and emotional response (Brown and Ryan, 2003; Van dam et. al., 2010; Gregório and Pinto-Gouveia, 2013). Therefore, enquiry into the behaviour of teams working on three similar, corresponding DfSI projects was conducted. The experience of the teams during their DfSI project, as explained by the team members and used as qualitative data during this research, can be categorised into five themes of investigation:

- The effect of multi-disciplinary setting on teamwork
- The effect of strength and ability to apply knowledge on teamwork
- The effect of leadership on the teamwork during the eight weeks of the DfSI project,
- The effect of input from the sponsors of the project on teamwork, and
- The effect of input from stakeholders from the community on teamwork.

The reflections from participants who chose to practice the AbMT intervention for eight weeks can be said to show that the meditative practice appears to have led the meditators to increased awareness through reflection during teamwork, because meditation helped them to:

- Reflect on managing their roles as a leader and as a subordinate during the DfSI project and switch between such roles calmly.
- Reflect on the development of one's own professional practice during their teamwork and for better performance in the future.
- Reflect on acting rather than reacting so as to behave cordially with other members of the team.

- Reflect on keeping an open mind to gain a fresh perspective toward the project.
- Reflect on the betterment of the team rather than one's own ego, to improve tolerance and indulge in action and reflection rather than prolonged unproductive discussions.

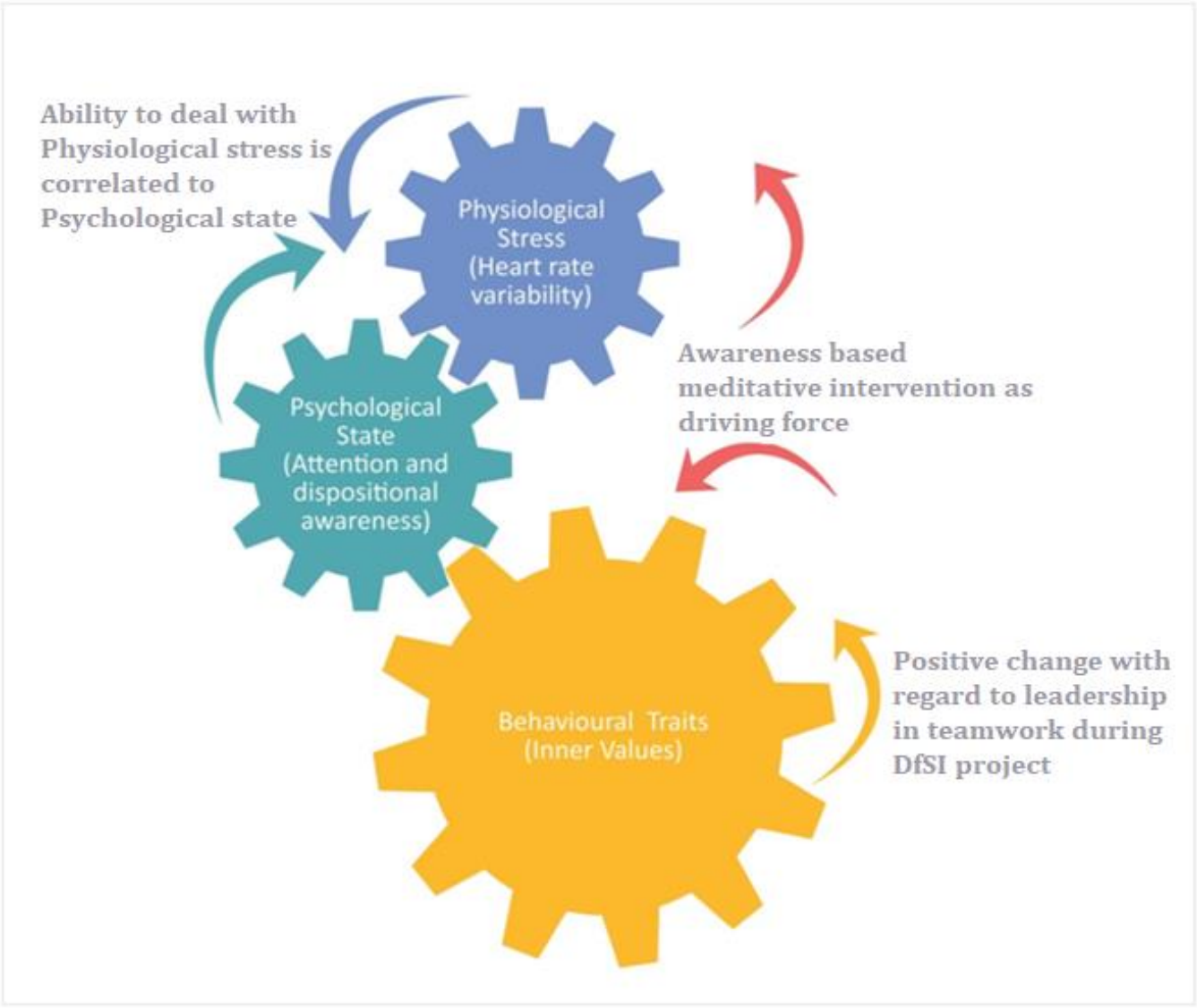
Though meditation could not be credited directly, teams with meditators reveal different actions than those with non-meditators. As seen in the above discussion, some differences between teams with meditators and those with non-meditators show:

- An increased appreciation for the opinions of other members of the team and an improved communication within the team.
- A higher inclination to work with a goal oriented approach as opposed to an ego-centric approach.
- Improved collective actions which surpass the definition of 'team' to include the community stakeholders and designing 'with' them rather than designing 'for' them.

Literature from Argyris and Schön (1974, 1987; also Payne et. al., 2008) shows that when professionals are reflective in such a way, the value system of the team improves along with their action strategy, then this leads to double-loop learning. The role of AbMT intervention in improving the inner value system through reflection can be said to be emerging with regard to improved collective leadership strategies being adopted by the teams with meditators. For example, when the team members opted to implement the strategy of an action-reflection cycle instead of prolonged unproductive debate, or decided to be cordial with others, or calmly work on the task-at-hand, these choices were made for better teamwork rather than an ego-centric approach.

Thus, this research reveals that an improved capability to deal with stress is correlated to improved attention and dispositional awareness and there could be a corresponding improvement in behaviour, especially the behaviour associated by the participants with collective leadership activities during their DfSI projects. Figure 8.11 below summarises this relationship between the different fields of knowledge that were studied during this research. The goal of this research was to generate a depth of information, which the triangulated understanding summarises below.

Figure 8.6: How the inter-disciplinary knowledge are related



8.5 Summary

This chapter discusses how the ability to deal with physiological stress is correlated to the dispositional awareness of an individual. Further, discussing the findings from the analysis of the quantitative data also verifies that all participants experienced physiological stress caused by project-work, which can be measured using HRV and that meditators experienced positive change in their ability to deal with physiological stress while non-meditators experience negative change.

The chapter further explores the findings from the thematic qualitative analysis of the teams and concludes that the leadership of teams with meditators was different compared to the leadership of the team with non-meditators and that this appears to be attributable to the practice of the AbMT intervention, which helped meditators to recognise the need for action instead of prolonged discussions, share their leadership responsibilities with other members of their team, switch between different roles calmly, keep an open mind toward the project and act cordially with other members of the team rather than reacting anxiously.

The chapter also recognises that there are other findings which cannot necessarily be credited to practice of the AbMT intervention, such as; every team faces problems while working in a multi-disciplinary setting and that every team faces problems due to the strength of knowledge and the ability to apply knowledge from one or more members of the team during DfSI projects. The discussion also shows that delays in feedback from stakeholders such as clients (project sponsors) led to a lack of direction and affected the DfSI project of all the teams and that each social innovation project benefited from obtaining input from community stakeholders during the DfSI project. However, the teams with meditators were able to cope better than the team with non-meditators, but again this cannot be confirmed to be an effect of the practice of AbMT intervention as a primary factor, though it is one of the major differences between the teams.

Chapter 9: Conclusions, Contribution to knowledge and Further Research

This chapter presents how the aim and objectives set for this research were satisfied through the review of literature, building of the research method, data collection and analysis to draw the conclusions from the research. This chapter also presents the original contribution to knowledge, the limitations of this research and the possible directions and needs for future research.

9.1 Aim and Objectives of this research

Aim: This research aimed to investigate the effects of Awareness-based Meditative Technique (AbMT) on the teamwork during DfSI projects.

Objectives: To achieve this aim, the following objectives were recognised:

Objective 1. To construct a working understanding of the key concepts.

Objective 2. To devise a methodology to appropriately apply the thematic qualitative analysis method along with the proposed model of inner values and integrate the necessary quantitative methods that can verify the effects of the AbMT intervention.

Objective 3. To conduct mixed-method research for gathering qualitative and quantitative data

Objective 4. To analyse and interpret the qualitative and quantitative data to draw conclusions:

A. To corroborate the successful practice of the AbMT intervention by the participants by analysing the quantitative data.

B. To understand the experience of different participants regarding their teamwork through the analysis of qualitative data and draw out their perceptions regarding the effects of AbMT, at individual and team level, during team-based DfSI projects.

9.2 Summary of the Literature review:

The first objective of this study was achieved by defining and discussing the key concepts. These are presented in Chapter 2 as Design (Section 2.2), Social Innovation (Section 2.3) and Awareness (Section 2.4). The review of literature shows that the increasing use of design for Social Innovation (DfSI) in different fields has led to an urgent need for professional growth and a drastic change in the value system of designers to improve the way they work within teams when applying DfSI. Such professional growth requires an act of becoming aware (Schön, 1983). While reflection is important for such growth, enactive cognitive science points to the act of becoming aware which can be achieved through meditative techniques (Varela, 1993). In consideration of this, the research focused on three key fields of knowledge, which show that the practice of Awareness-based Meditative Techniques

(AbMTs) can improve a person's physiology, psychology and behaviour while working in teams during DfSI projects (Section 2.6.5).

In the past, awareness-based practices have been studied from both physiological and psychological disciplinary perspectives (work by; Kabat-Zinn, 2002, Siegel, 2008, Davidson, 2012, Rauch et. al., 2011 and many others have been discussed in section 2.7.2). Such studies have formed a knowledge base around the effect of Awareness-based practices on the human mind and body. One such proven study method is HRV, which quantitatively shows how Awareness-based practices have a positive effect on psycho-physiological stress. Such knowledge is objective but does not provide details of the changes in behaviour or the inner value system. Such details are important while studying the effect of AbMT on teamwork during DfSI projects. Therefore, key inner values, which literature shows to be essential for teamwork during DfSI and which are affected by the AbMT practice, have been recognised. These are Hopefulness for co-operation, Generosity of Spirit, Forgiveness from defection (as defined by Nowak and Highfield, 2011), Patience (Grossman, 2011), Acceptance (Kabat-Zinn, 2000), being Non-judgemental (Kabat-Zinn, 2013) and keeping a Beginner's mind (Suzuki, 2010). This list of inner values has been used to build a model (Table 2.1), which can be used to understand teamwork during DfSI projects. However, such an inter-disciplinary research approach requires thorough understanding and mixing of qualitative and quantitative methods to gather both objective and subjective empirical evidence regarding the effect of AbMT on teamwork during DfSI projects.

9.3 Summary of the Research method:

The study of meditative technique raises the need to verify the effective practice of AbMT intervention by the participants. Previous studies of AbMT have shown its positive effect on the physiological stress levels of a person (Davidson, 2012; Rauch et. al., 2014; Kabat-Zinn, 2013). Using quantitative research methods, the response to physiological stress can be used to confirm the effective practice of the AbMT intervention by the participants (section 2.8.2). As mentioned earlier, such quantitative techniques do not provide details about the change in behaviour of participants or about any change in teamwork during DfSI projects. While case study and participatory approaches can help to build a level of detail, they have been criticised as subjective records. Valkenburg and Dorst (1998) proposed a method based on Schön's 'Reflective practitioner' (1987) and this method assists in recognizing the design

activities of a team, based on their actions and decisions. Using this method as part of thematic analysis, this research sought to reduce the subjective influence of the researcher during analysis and align the process with the most developed thinking about the different types of design activities. Further, to understand the inner value system, the proposed model of inner values is applied to add to the understanding from the thematic analysis of the qualitative data. The qualitative data was collected during post-project semi-structured interviews. Thus, both qualitative and quantitative research methods were carefully combined into an inter-disciplinary mixed research method, which have been explained in the Research Method chapter (Section 3.3).

Firstly, an appropriate AbMT intervention was recognised, which was applied during teamwork for DfSI projects (Section 3.6.2). Then, the procedures, challenges, ethical considerations and risks associated with the use of mixed-method research (Section 3.5) generated the need for robust data collection and data analysis strategies for both qualitative and quantitative data. For this reason, clear protocols for qualitative and quantitative data collection for the inter-disciplinary mixed data collection method have been defined (section 3.6.5 and 3.6.6). Finally, a strategy for analysis was devised to analyse the qualitative and the quantitative data so as to draw out consistent and robust conclusions (Section 3.7). Thus, clearly identifying and defining the research method accomplishes the second objective set for this research and yields a contribution to knowledge about the research method, design and application for the context of this study.

In addition to this, three mini-studies have been carried out and presented in this thesis (Chapter 4). The first study (section 4.2) was undertaken with expert design practitioners to verify the face validity of the list of inner values derived from the literature review (section 2.5.1.4) in terms of their usefulness to real-world teamwork for DfSI. The second study (section 4.3) involved inter-rater reliability to verify internal validity of the process of qualitative analysis designed for this research. The third study (section 4.4) verifies the appropriateness of the device used for HRV data collection together with the formulae for calculation and quantitative analysis.

9.4 Data, Analysis and Interpretations

To satisfy the third objective set out for this research, twelve suitable participants were chosen and grouped into three separate teams. Qualitative and quantitative data was collected

while these three teams worked for eight weeks on three similar, but not the same, DfSI projects (explained in chapter 5). Quantitative data was collected using two sessions, first towards the start and second towards the end of the social innovation projects. Qualitative data was collected using post-project, semi-structured interviews, where questions were asked based on different themes of investigation regarding teamwork during the DfSI projects.

Quantitative data was collected during this research using two tools. Heart Rate Variability (HRV) scores helped in determining the change in response to psycho-physiological stress created by a Stroop test while the psychology based MAAS questionnaire (Mindful Attention and Awareness Scale) provided a score to determine the change in attention and dispositional awareness of the participants (see section 6.3.3). The response to physiological stress illustrates the ability of the participant to deal with stress and the data shows that such ability is improved through regular meditative practice but deteriorates due to the day-to-day stress of the project work. An investigation into external factors, other than the AbMT intervention, affecting the participants during the eight weeks of data collection were taken into account, while drawing the conclusions (discussed in section 8.2). Further, the data proved that for the given participants, the physiological stress and the level of attention and dispositional awareness were negatively correlated, so when stress levels decreased, the level of attention and awareness increased and vice versa.

Qualitative data was collected and stored in the form of transcripts. The data was firstly divided into themes of investigation for coarse-level segregation and then quotes and sub-quotes for fine-level analysis. The arguments arising from the quotes were used to build the case for teamwork during the DfSI projects. Valkenburg and Dorst's (1998) explanation was used to recognise the context in terms of design activity and the phrases and sentences in the quotes have been used to evaluate the existence or lack of inner values in the teamwork during the DfSI projects. The quantitative and qualitative analyses were used to satisfy the fourth objective set for this research.

9.5 Conclusions from the research

Findings from the quantitative analysis:

1. The quantitative data collection method was verified and confirmed as robustly applied (section 6.3-1).
2. It was confirmed that there was a minor negative effect of stress on the physiology of the participants after working for eight weeks on the social innovation projects (section 6.3-2).
3. It was found that within the collected dataset, the change in dispositional awareness calculated using the MAAS score and the change in the response to physiological stress calculated using the HRV scores were correlated (section 6.3-3b).
4. The meditators and non-meditators in the teams were confirmed. Team A with participants 1, 3, 5, 10 and 12 was confirmed as a team with all meditators. Team B was made up of participants 2, 6 and 11 and recognised as a team with all non-meditators. Team C was made up of participants 4, 7 and 9. Participant 4 was a meditator and participants 7 and 9 were non-meditators, and team C was recognised as a team with both a meditator and non-meditators (section 6.3-4).

With these findings, it can be concluded that the participants who chose to practice AbMT had done so successfully as they showed an improved ability to deal with psycho-physiological stress.

Findings from the qualitative analysis

92 quotes from 12 participants were analysed (also presented in appendix 1) and it was found that:

1. Every team faced problems while working in the multi-disciplinary setting of their teams (section 8.3.1) and with regard to the strength and ability to apply knowledge (section 8.3.2). The members of team with meditators (teams A and C) reflected that they had more effective ‘framing’ and ‘reflecting’ activities to handle the multi-disciplinary nature of the teams and share knowledge during their DfSI project, while members of team with non-meditators reflected that they did not manage to do so. However, it could not be conclusively asserted that improved ‘framing’ and ‘reflecting’ activities were affected primarily because of the AbMT intervention, though the intervention was one of the major differences between the teams.

2. Teamwork during the DfSI project was considered to have evolved due to the practice of the AbMT intervention because (section 8.3.3), members of the teams with meditators mentioned in seven instances that AbMT practice played a role in helping them and their reflections qualify the findings that AbMT intervention helped to:
   a. share the responsibilities pertaining to leadership of their team not only with other members of their team but with wider community of stakeholders,
   b. resolve disagreements cordially and practically so that needs of team were given importance over personal ego,
   c. manage personal responsibilities calmly as leader and follower within the team and
   d. keep an open mind to gain fresh perspective through reflective activity.
3. Every team faced problems while getting useful input from the client (sponsor) of their DfSI project (section 8.3.4). According to the members of teams with meditators (teams A and C), they had a more effective attitude and used 'reflecting' activity during their projects to make effective use of inputs from their respective clients. However, it cannot be conclusively asserted that such a difference in attitude was an outcome of the AbMT intervention, though the intervention was one of the major differences between the teams.
4. Each social innovation project benefited from obtaining input from community stakeholders (section 8.3.5). The members of all the teams explained how they all began with an inclination toward community involvement. However, the teams with meditators (teams A and C) could employ participatory approaches to develop design solutions 'with' the community stakeholders. While doing so, members of team with all meditators explained that they all got overly influenced by inputs from the community stakeholders and temporarily lost focus of some key aspects such as financial viability, until the sponsors brought the team's attention back to these aspects. On the other hand, the team with non-meditators (team B) reflected that they could not involve community stakeholders as much as they had hoped because of problems with planning and distractions due to internal problems within their team. Though the relationship between the practice of AbMT intervention and the effective inclusion of community stakeholders in the DfSI projects could not be conclusively asserted in the data collected during this research, the intervention was one of the major differences between the teams.

Such findings lead to the conclusion that AbMT intervention could have positive effects on teamwork during DfSI projects, especially with regard to the responsibilities perceived as the leadership of the team, and there is an urgent need to explore this in further research.

9.6 Contribution to knowledge

This research has been built on organizational learning theories (Argyris and Schön, 1987), which recognise the importance of a change in the inner value system, as well as action strategies, for teamwork during DfSI projects. This research recognises the inner values from inter-disciplinary literature pertaining to teamwork, DfSI and awareness-based meditation (section 2.5.1.4). This research also uses real-world expert design practitioner account to provide face validity of these inner values with regard to teamwork during DfSI projects (section 4.2). Then, using positive psychology-based criteria, the list of inner values has been proposed as an analytical model, which may be used to explore (and visualize) the inner value system, from the reflections provided by design teams. The application of this proposed model is demonstrated through this research (section 7.4). Thus, the contribution to knowledge during this research is the novel model of inner values (table 2.1 in section 2.8), which has been derived from key inter-disciplinary literature (section 2.5.1.4) reviewed by expert design practitioners (section 4.2) and applied to understand the inner value system of design teams while they work on DfSI projects (section 7.4).

The next contribution to knowledge from this research is a novel mixed research methodology used for understanding the effect of the practice of the AbMT intervention on the physiological stress, psychological state and behavioural traits during DfSI projects. The quantitative methods help in creating empirical evidence on physiological stress using HRV and empirical evidence on dispositional awareness using a psychology based MAAS questionnaire. The qualitative methods utilise post-project semi-structured interviews to build cases using the thematic analysis method to understand the arguments made by the participants. Then, using Valkenburg and Dorst's (1998) explanation of design activities the context of such arguments is understood. Finally, using the proposed model of inner values, an understanding of the inner value system of the teams is provided. The methodological issues such as priming, Hawthorne effect, internal validity and construct validity have been addressed (see chapter 3). Thus, the second contribution from this research is a novel mixed-method research using inter-disciplinary approaches for building evidence that can be used

during Design research to understand the effect of the AbMT intervention on teamwork during DfSI projects.

Lastly, this research focused on studying if the AbMT intervention can have positive effects on the teamwork during DfSI projects. The qualitative analysis showed difference between approaches by meditating and non-meditating teams. When considering the responsibilities that team members perceived as leadership of their team, the participants provided seven instances where AbMT intervention was primary cause of cordial behaviour in their teamwork during DfSI projects (see findings in section 9.5). The reflections from participants qualify four findings of positive effect of the AbMT intervention at an individual level and at team level, which are:

- to reflect on their own behaviour and alter their action strategies for the betterment of the team
- the AbMT intervention helped meditators to conduct deliberations cordially and practically, putting needs on team above their own ego
- manage personal responsibilities calmly, share the decision making with other team members and stakeholders and
- keep an open mind to gain fresh perspective about their DfSI project.

Regarding the reflections from participants on working in multi-disciplinary setting, working with client (sponsor) and involving wider community of stakeholders it could not be exclusively said that the AbMT intervention was the primary cause of positive change. But the meditating team did become overly influenced by community which was brought to notice by their client. Thus, it can be said that, participants believed that the AbMT intervention had a positive effect on their ability to do teamwork during DfSI projects, especially with regard to the responsibilities perceived as the leadership of the team.

Therefore, the three original contributions to knowledge arising from this research are;

1. The model of inner values, which is verified by a review with expert design practitioners and applied to understand the inner value system during teamwork for DfSI projects.
2. The novel interdisciplinary mixed research method, which provides an objective as well as a descriptive report for unveiling the effect of the AbMT intervention on the physiology, the psychology and the behaviour during teamwork for DfSI projects.

3. The AbMT intervention appears to have a positive effect on teamwork during DfSI projects based on quantitative evidences and on the reflections from participants, especially those with regard to the responsibilities perceived as the leadership of the team.

9.7 Limitations of this research and Ideas for further research:

The following section explores limitations of this research leading to further research ideas which are summarised below and subsequently explained in detail:

- Novel inter-disciplinary research method needs to be applied on larger scale with variations in teams and project types.
- Addressing priming effect, Hawthorne effect, internal validity and construct validity needs to be applied on other types/forms/procedures of the AbMT interventions and investigate the additional inner values suggested by expert design practitioners.
- The causal relationship between AbMT and what are determined as the effects of the intervention, is unclear.
- This research focused on the depth of information using theory testing rather than theory generating research strategy and further research is required to explore other aspects such as collaborative work, authentic leadership and co-evolving problem and solution while exploring teamwork during DfSI project.
- This research may have its application in other fields of knowledge which needs to be explored in further research.

This thesis assessed the effect of the AbMT intervention on teamwork during DfSI projects and attempts to address the ways in which AbMT may improve the physiology, the psychology and the behaviour when teamwork is applied for DfSI projects. This research establishes a novel relationship between conceptual knowledge from different disciplines. The application of such a mixed-method research process required commitment of time and effort. This includes creating and abiding by the stringent selection criteria, so that the most appropriate social innovation projects could be studied and also includes cross-checking the internal validity of the data collection and analysis method. Due to constraints on time, resources and the difficulty of maintaining reliable ways of collecting and analysing data, this research has not been conducted on a large scale. The participants of this research were students from professional Masters course called Multi-disciplinary Design Innovation (MDI)

where they worked on real-world projects as students with the overarching goal of developing their professional practice to apply design approach. Educational context brought forth certain conditions which would not exist in professional DfSI projects, such as lack of formal leadership within team, lack of experience in applying design-led innovation and lack of implications and motivations that drive professional design teams. However, this limitation provides opportunities for future research. The mixed research method established and applied during this research leads to an urgent call for similar studies on a larger scale, using diverse samples along with combinations on other variables such as size and constitution of teams, length of project, culture/background and knowledge and experience of participants.

During this research, it was paramount to reduce the priming effect that intervention has on participants. Therefore, the AbMT intervention selected during this research, called 'the three-minute breathing space', was an adaptation of a well-established practice, which was revised during a workshop with the help from several different expert practitioners of different AbMT practices, GPs, Psycho-therapists and researchers. The three-minute breathing space was stringently neutral and did not prompt behaviour of the participants or inspire them to act in a certain way during their teamwork. Further, this research has also tried to limit the Hawthorne effect while providing training to the participants. This has been achieved by introducing participants to the AbMT process with the help of subject experts. These experts focused only on making participants understand the steps of the intervention and did not focus on the advantages or any changes that the intervention may lead to. Thus, this research on the AbMT intervention has tried to limit competing variables to an acceptable level so that internal validity could be achieved. However, it should be noted that this research takes a post-positivist stance where achieving complete validity is considered very difficult and the problem of researcher's subjective experiences affecting research cannot be avoided completely. However, this research limited the researcher's views on the DfSI projects by gathering views from the design team and analysing their views. Even baseline for such behaviour has not been applied by the researcher and comparison of behaviour/choices has been collected during post-project reflective interviews with the design team members. Thus, this research brings together different perceptions to build a meaningful narrative of teamwork which can be thematically be comparable with teamwork by other teams. Further, the focus of concerns regarding validity rose from the theoretical model of inner values and supporting studies were conducted to validate the proposed model using the views from expert design practitioners. The tools used for collecting quantitative data have

also been validated with supporting studies. Finally, the supporting study called inter-rater reliability was conducted with expert design researchers to maintain the internal validity of the conclusions drawn by the researcher. Though these studies addressed the robustness of this type of work, they created constraint on time which has limited this research to the study of the effect of the selected AbMT intervention. Study of other types/forms/procedures of the AbMT interventions was considered beyond the scope of this research but can be conducted in further research with robustness using supporting studies defined by this research.

Selection of participants during this research was based on pre-identified criteria. But the choice to practice AbMT intervention was left upto the individuals because the intentionality during practice of AbMT is very important and awareness cannot be forced upon participants through the use of intervention. However, when participants selected to practice AbMT, this research visualises certain inner values. Such inner values can be said to become active due to AbMT, but it cannot be denied that such inner values already existed in the participants and could be a reason for the participants to choose to practice AbMT in the first place. Thus, there is causality between AbMT and inner values, but the understanding of this relationship is ambiguous and needs urgent clarity in further research.

During qualitative research, Valkenburg and Dorst's (1998) understanding of design activities has been used to map the context in which the participants make their arguments about the teamwork during their DfSI project. This research also proposes a model of inner values, which has been applied to understand what the inner value system of the team may have been during their DfSI project. The construct validity of both these concepts was verified using input from expert design researchers and practitioners respectively. These have been called supporting studies to the actual research (see chapter 4). It needs to be acknowledged that such construct validity has its limitations due to the constraints on time and resource and should not be considered universal but limited to the specific context of this research. Thus, a further review of literature and supplementary supportive study for validity is required to identify methods of mapping design activities in further detail and also to investigate the additional inner values that were identified to be useful by the expert design practitioners and which have not been considered in the original literature review during this research.

This research focused on the depth of information (see different types of analysis explained in chapters 6 and 7) while the width of information was fixed on certain factors (see the themes

of investigation in section 7.2). This was noted by expert design researchers in the supportive study who portray this research as theory testing rather than theory generating. Therefore, this research portrays a limited portion of the teamwork during the DfSI projects, and many other factors (or themes as they have been called during this research), such as collaborative work, authentic leadership and co-evolving problem and solution etc. need to be considered for understanding the complete picture of teamwork during DfSI projects. Dorst (2011) refers to this problem, saying, "*To understand the complex and sometimes puzzling field of design practices we have to realize that they have been developed in response to a particular need. It would be impossible to really understand design or even to find commonality in the incredibly diverse array of design practices without first referring back to the core challenge of design.*" Thus, this research accepts that describing teamwork during DfSI through the context of design activities and an inner value system simply scratches the surface of the complex process and calls for further research to explore other aspects of teamwork during DfSI. The relationship between different design activities and inner values remains beyond the scope of this research and future research may try to focus on how different inner values form an internal system and investigate which design activities are affected by them.

This research may have its application in other fields of knowledge and this has not been explored during this research. Possible applications may include the use of inner values by Design educators to recognise their students' learning needs and customise training and guidance accordingly. This may be the researcher's next step. Another application of this research is the use of the mixed research method in other fields of knowledge. This is being conducted by Paras Patel in the school of Engineering and Environment at Northumbria University to study the effect of different types of AbMTs. Yet another application of this research is the development of professional ability for citizen engagement, which can be enhanced by building the appropriate environment that is beneficial for teamwork during DfSI projects. This is the focus of engagement of Paul Emmerson's study of Design-as-Civics. (Emmerson, 2017), who's work follows in the wake of this study at Northumbria University.

9.8 Dissemination of knowledge

- A talk was presented at Faculty-wide research seminars on two occasions, 15th September 2011 and 12th of July, 2012.

- This research was presented at University wide research seminars on two occasions, 20th of October, 2011 and 12th of June, 2013.
- A workshop titled 'Three-Minute Breathing Space' was conducted from 12th to 14th of August 2012 where multi-disciplinary experts contributed and peer reviewed tools utilised during this research.
- A talk was delivered on 'The usefulness of meditation for design' at MDI Labs on 15th of July, 2013 by the researcher and a panel of experts.
- First author publications from this research are:

Vyas, P. and Young, R. (2017) 'The role of inner values to teamwork during design for social innovation'. *Proceedings of DMA conference, HongKong.*

Vyas, P., Young, R., Sice, P., & Spencer, N. (2016, June) 'Assessment of the co-creative process'. *Proceedings of DRS 2016, Design Research Society 50th Anniversary Conference.* Available at: www.drs2016.org/334/

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Glossary

Acceptance: Acceptance is experiencing events fully and without defence, as they are (Hayes, 1994, p. 30).

Autonomous Nervous Systems (ANS) : Autonomic Nervous System (ANS) regulates functions of different body parts through electrical signaling in response to different stimuli.

Awareness-based Meditative Technique (AbMT) : Meditative techniques that focus on developing Awareness through regular sincere practice.

Awareness: Awareness is: "*...paying attention in a particular way: on purpose, in the present moment, and non-judgmentally"* (Kabat Zin, 2003, p.144).

Beginner's mind: Beginner's mind is relinquishing control over a particular thought or idea or preconception (Deraz, Varela and Vermersch, 2000)

Case Study approach is a strategy for qualitative research where the researcher can address complex situations that surround real-world projects and analyse the changes in their multiple complex variables (Yin, 2011).

Construct validity refers to the ability of a measurement tool (e.g., a survey, test, etc) to actually measure the psychological concept being studied. It is the test of the appropriateness of a proposed model.

Design: "*a process of change, an activity undertaken not only to meet changing circumstances, but also to bring about changes to those circumstances by the nature of the product it creates"* (Mayall, 1979, p.121).

design: "*the purposeful activity initiated by the recognition of a perceived problem or opportunity, which through the application of energy, skill and resources leads to re-arranging the reality, set against a particular contextual backdrop of broader change so that the changes facilitate value and benefit to an identifiable quantity of people who come into contact with the changes*" (Spencer, 2009).

Experiment-based approach utilise clinical settings where variables influencing results are controlled and implement established strategies, tools and techniques to provide scientific empirical evidence that is reliable (provable) and replicable.

Forgiveness: is "*the ability to reciprocate defection with co-operation in the next interaction, with a certain probability*" (Nowak, 2011, pg. 223).

Generosity of spirit: is "*the ability to accept a smaller share of benefits of co-operation*" (Nowak, 2011, p. 208).

Hawthorne Effect is the process where human subjects of an experiment change their behaviour, simply because they are being studied.

Heart Rate Variability (HRV): variability between successive heartbeats is indicative of heart rate regulation through vagal tone.

Hopefulness for co-operation: is *"the intention that the first move of both the parties will be towards co-operation*" (Nowak, 2011, pg. 272).

Inner values: Inner values are beliefs and motivational construct that transcend specific actions and situations (Schwartz, 2009)

Internal validity is the extent to which it could be said that no other variables except the one being studied is the cause for the result. It is the confidence that we can place in the cause and effect relationship in a scientific study.

Mixed-Method Research (MMR): Research method where both quantitative and qualitative methods are used.

Non-judgemental: Being Non-judgmental is the action of describing the facts objectively, and not thinking about 'good' or 'bad', 'fair' or 'unfair'. Judgments encapsulate feelings about the situation, are irrational and cannot be explained. (Dreyfus, 2011, pg.53).

Participatory approach is practice-oriented approach to action research where the researcher is not merely a passive observer but actively involved in the creation of new knowledge (Schön, 1983).

Patience: Patience as an inner value is not to interrupt or react before letting an occurring event unfold completely (Grossman, 2011).

Physiological Stress: "*Stress is non-specific strain of the body caused by irregularities in normal body function"* (Selye, 1956, p.58).

Priming effect is caused by suggestion during training and leads to subtle alteration of behaviour which is temporary and not the true effect of the training. In psychology, priming is a process in which the processing of a target stimulus is aided or altered by the presentation of a previously presented stimulus.

Psychology-based approach is mostly surveys using psychology-based questionnaires derived from an understanding of human psychology and tested rigorously for their effectiveness with a particular demographic dataset.

Social innovation: In social innovation, the importance should be for the intentions for social innovation at the beginning of the project (with any economic achievements as one of the goals, but not as the only goal) as well as the tools and methods that define appropriate technique for creating social change (that are acceptable to the people they change) and also the eventual outcomes created which should be a change in a person or group of people.

Stroop test creates psycho-physiological stress using computer game technique. It is a cognitive ability and performance test.

Vagal Tone: electrical signals being sent by ANS to the Heart.

Inter-disciplinary study of Team-work during Design for Social Innovation projects

Volume 2: Appendices

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PhD
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A thesis submitted in partial fulfilment of the requirements of the University of Northumbria at Newcastle for the degree of Doctor of Philosophy
Research undertaken in the School of Design

Table of Contents

Appendix 1: The qualitative data and analysis

1.1 Analysis of theme 1: The effect of multi-disciplinary nature on the team work during DfSI project

Step 2: Creating Data matrix to organise data:

Participant	**Quotes that support effective team work during DfSI**		**Quotes that refute effective team work during DfSI**	
Subsection 1/A: Team A	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	3.1 3.2 3.21 3.26 5.2 5.3 10.1 10.2	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.1	1.1 1.3 1.4 12.1 12.4 12.5	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.1.
Subsection 1/B: Team B			Quote Number	Where to locate in the thesis
			2.4 6.1 6.10 11.1	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.2
Subsection 1/C: Team C	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	4.1.2 7.1.1 7.3	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.3.	4.1.1 7.1.2 9.1 9.2	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.1.3.

1.1.1 Analysis of team A

Step 3: Making Observation for Subsection 1/A

The first quote is from participant 3, who says:

> *"The thing is that the strength here is that all the different disciplines are coming together and they contribute in the way that we won't be able to contribute. So it's like an exchange of the skills and they would be responsible for things that we won't, you know, be able to help much. So, it all depends on what kind of project - if all those skills are really necessary to work on this project"* [Q3.1].

Step 3.1: Thematic analysis to recognise the arguments made by the participant

The participant explains the general concept of multi-disciplinary working within their teamwork during DfSI as an exchange of skills and a shared responsibility of the project. Thus, it appears that the participant is making an argument that:

Argument 1/A-3.1: *The team shared skills and information with each other during teamwork.*

The participant uses the phrase "*So it's like exchange of the skills and they would be responsible for things that we won't*" (Q3.1). This phrase explains the division of labour created by the team based on their awareness of diversity. It led the team to organize themselves which, based on Valkenburg and Dorst's (1998) explanation, should be coded as a 'framing' activity during the DfSI project.

Note: The argument is numbered as argument 1/A (representing sub-section code) - 3.1(representing quote number).

Step 3.2: Applying the proposed model of inner values

In the quote, the participant mentions "*exchange of skills*" and "*responsible for* (different) *things*" can be said to indicate the inner value of Hopefulness for co-operation within members of team A as the participant can be said to explain the nature of co-operation within team A. The participant does not mention this exchange in terms of good or bad practice, or fair or unfair trade. Instead, the participant mentions, it's the need of the project, which can be said to show that the team possibly had the inner value of being Non-Judgemental. Thus, it appears that the inner values observed in quote 3.1 are {+H+N}. These are visualised as:

The next quote in this sub-section is Q3.2, again from participant 3, and it explains:

> "*For example, they* (business students) *need to have everything planned. And maybe that's why we were quite like organised and, you know, everything was, we knew like within a week what we are doing and what time and what's happening and what outcomes are supposed to be of our actions. So, I think in terms of that it was quite helpful for the project. Like, this kind of approach that everything, you know, was organised. Because I think within design students it won't be possible. These people I think they are more, they are not organised. We cannot, you know, like plan maybe that they were, like precisely. Designers were like, all the aspects, you know, of like kind of creativity and all the visual side of it possibly. And because while we are working we could see all the propositions that others like, I mean business of engineering students, they are giving, they, you know, it's not exact, you know, like nothing like imaginative - it's nothing new. So, definitely the creativity"* [Q3.2].

Step 3.1: Thematic analysis to recognise the arguments made

Though the quote appears disjointed, the audio recording provides clarity that participant 3 is talking about different disciplines complemented their strengths and covered each other's weaknesses. Thus, the argument made by the participant appears as:

Argument 1/A-3.2: *The team invested in development of a shared plan, which organized different aspects of teamwork.*

The team organized and communicated the distribution of workload and responsibilities within the team in a co-owned manner, which can be seen in the quote as a result of team-organizing activities conducted by the team during initial weeks of the project. The activities appeared to lead to improved awareness of the team about their diverse skills and a shared a plan to communicate and share such skills. Such shared planning can be interpreted as a 'frame' of reference, using the explanation from Valkenburg and Dorst (1998). Thus, it can be said that the participant is referring to the 'framing' activity of the team and explaining the effect of such shared frames on teamwork during the DfSI project.

Step 3.2: Applying a model of inner values

The participant appears to describe preconceptions about the attitude of designers, business and engineering members of the team in the above quote. This could be interpreted as a lack of the inner value of Beginner's mind because the team did not have open-minds towards the

role each disciplinary member could play during teamwork. Further, the participant highlights the shortcomings of different disciplines saying designers "*are not organised*" and non-designers produce "*nothing new*", which appears to be Judgemental behaviour. As explained in chapter 5, expert design practitioners have revealed that being Non-judgemental does not mean a team member would not have an opinion, it means that, '*judging and exploiting situations may not be as counter-productive as literature suggests and it could be a necessary step in the design process during DfSI*'. Based on this interpretation, the participant seems to explain how the team's evaluation of strengths and weaknesses were not negative judgments and such an evaluation helped the team to exploit strengths and overcome drawbacks. Thus, the observation of the participant being judgemental or the team lacking the inner value of being Non-judgemental is not accurate but a mere display of the inner value of Acceptance of the teams abilities before manipulating them. Thus, the inner values observed in quote 3.2 are {+A-B} and visualised as:

The participant further mentions,

> "*We had good organisation and that was really important and we had very good communications within the team. Like, you know, everyone could say what they think about the project or what ideas they had and, you know, everything was heard and we had discussions about everything. So I think that was very good and important*"[Q3.21].

Step 3.1: Thematic analysis to recognise the arguments made

The participant highlights the open communication between members of team A, which was an important factor for their effective teamwork. The argument that appears to be presented in the quote is,

Argument 1/A-3.21: *Open communication and discussion of ideas helped teamwork.*

The participant explains that, "*everyone could say what they think about the project or what ideas they had*". The generation of ideas based on a certain understanding of the DfSI project can be categorised as a 'moving' activity using Valkenburg and Dorst's (1998) explanation of

design activities. On the other hand, the phrase "*everything was heard and we had discussions about everything*" could be interpreted as part of the collective 'reflecting' activities or as a 'moving' activity or both. Thus, the participant appears to refer to 'moving' and 'reflecting' activities undertaken by team A as part of teamwork during their DfSI project.

Step 3.2: Applying the proposed model of inner values

Everyone being able to "*say what they think"* and share "*ideas"* can be said to reveal the inner value of Hopefulness for co-operation within team A during their teamwork. The participant also mentions "*everything was heard*" and the team discussed "*everything*". This can be said to show the inner value of Acceptance of other's views during teamwork. Thus, the inner values arising from the quote can be said to be {+H+A}, visualised as:

In the next quote the participant mentions,

> "*We solved problems, maybe it was like confidence in the communication within the team. I mean I don't think I had a problem because every time when there was something important I just said that*" [Q3.26].

Step 3.1: Thematic analysis to recognise arguments made

The participant mentions how confidence in the communication within the team was useful for problem solving. Thus, the argument presented appears to be,

Argument 1/A-3.26: *Problem solving through confidence in open communication helped teamwork.*

Solving internal problems, sharing ideas and opinions during the DfSI project was possible in team A due to open communication, which is seen in the phrase, "*we solved problems*". This suggests that the team would 'reflect' and 're-frame' their teamwork based on opinions, suggestions and ideas from individual members of the team. As such activities supported the DfSI project but did not actually contribute directly to the design process, by Valkenburg and Dorst's (1998) explanation, this can be coded as a 'framing' activity. If the participant was

talking about ideation then it would be coded as a 'moving' activity and this was confirmed by re-visiting the audio recording, where the participant was talking about the solving of inter-personal problems and not about design activities for creating solutions. Thus, the participant appears to refer to 'reflecting' and 'framing' activities undertaken by team A as part of teamwork during their DfSI project.

Step 3.2: Applying the proposed model of inner values

The phrase pertaining to problems being solved because of, "*confidence in the communication"* reveals the inner value of Hopefulness for co-operation within team A. The participant mentions these experiences occur without defence in the team and mentions, "*every time when there was something important I just said that".* As seen in chapter 5, the inner value of Acceptance means, *'experience an event in a balanced way'* and that, '*Social innovation with design requires you to accept but also have ability to change things.*' The phrase indicates such balanced acceptance with wisdom to change situations existed within team A when the participant uses the phrase, '*saying something that needs to be said*'. This appears to indicate the inner value of Acceptance in team A. Thus, inner values interpreted from quote Q3.26 are {+H+A}, visualised as:

In the next quote, participant 5 mentions,

> "*In a multi-disciplinary team it's like, 'I know this bit, you know that bit. Let's put it together and see if it works', kind of thing. I work better with a multi-disciplinary team, 'cause each person says they're doing something else, and they know more about something else. They focus on that and then will bring it to the table, and they trust ... we trusted each other, like, I know you know about the business, you know about design, so I'll do this and you do that and then we'll put it together"*[Q5.2].

Step 3.1: Thematic analysis to recognise the arguments made

The participant explains, there were complementary skills being exchanged mutually based on trust. Thus, the argument presented in the quote appears to be:

Argument 1/A-5.2: *Development of trust helped to share responsibilities during teamwork.*

During the DfSI project, team members trusted each other to share the completion of tasks between themselves. This stemmed from an awareness of each other's abilities explained by a participant as the philosophy of their team "*'I know this bit, you know that bit. Let's put it together and see if it works', kind of thing."* What the participant refers to is a 'framing' activity that the team performed towards the start of the project, where members of the team 'reflected' on their own strengths and weaknesses and then used that to share responsibility based on a shared 'frame' of reference towards their project. Thus, using the explanation from Valkenburg and Dorst (1998), it can be interpreted that awareness of diversity and clear communication created trust as the common 'frame', which helped the team during 'moving' activities. Thus, the participant appears to refer to 'framing', 'moving' and 'reflecting' activities undertaken by team A as part of teamwork during their DfSI project.

Step 3.2: Applying the proposed model of inner values

The team appears to show the inner value of Hopefulness during teamwork, revealed in the phrase "*I know this bit, you know that bit. Let's put it together and see if it works"*. Further, the participant mentions "*trust*" between the members of the team, which can again be said to be the inner value of Hopefulness for co-operation within team A. Thus, inner values observed in quote Q5.2 are {+H}, visualised as:

When asked if her observation of the exchange of skills would be true if the team was bigger in size, the participant replied,

> "*it doesn't matter what size is it, it depends on the role of each person on the team, because you can have ten people, but they might be really good at doing one thing, like one is a researcher, one is a visualiser, one is... you know?*" [Q5.3].

Step 3.1: Thematic analysis to recognise the arguments made

The participant explains that, the experience of sharing a variety of knowledge in a collegial manner brings value to teamwork during DfSI projects. Even though the quote provides insight into good teamwork, it does not provide an argument because the participant does not mention the quote in relation to teamwork during the DfSI project by team A.

Step 3.2: Applying the proposed model of inner values

The inner values are not determined because the quote is not considered to be relevant to teamwork by team A.

Participant10 takes a different stance on the effect of multi-disciplinary working on teamwork by team A. He mentions,

> "*I don't think it would have been better if it was all my discipline, because you wouldn't get the insight of the designers who are more likely to openly minded think about, where probably I would try technical reasons- where what might work and solving problems through that. So, it's probably better having people who have radical ideas and solutions to the problem. I mean with same discipline may be we would have understood each other better and maybe been able to work more efficiently. But I think for the work place in the future, you can't choose who you are working with, it's great sort of practice for that really*"[Q10.1].

Step 3.1: Thematic analysis to recognise the arguments made

According to participant 10, the multi-disciplinary aspect provided drastically different ways of thinking, which was important for problem understanding and solving. Thus, the argument made in the quote appears to be:

Argument 1/A-10.1: *Exchange of skills was possible due to multi-disciplinary team members.*

The diversity of skills provided a learning opportunity, which the members exploited as explained in the phrase, "*Certainly in a work place, you have to get on with whoever you work with really. So this is like good practice, to get to know new people, different people and get along with them and work with them*"(Q10.1). Such activity is coded as 'reflecting', because it directly relates to past activity being used for betterment of future activities duing the DfSI project.

Step 3.2: Applying the proposed model of inner values

The participant mentions, "*wouldn't get the insight of the designers who are more likely to openly minded think about where probably I would try technical reasons",* which can be said to show that the team had the inner value of Hopefulness for co-operation. By focusing on the future, the participant can be said to show preconceptions from the past and for the future, which are described in this research as the lack of the inner value of Beginner's mind. But, as seen in chapter 5, expert design practitioners give importance to understanding when a preconception existed. A lack of beginner's mind would be an improper characterisation because the participant is reflecting during interview but may not have had the preconceptions during the project. If anything, the participant's argument for personal

development can be said to show the Beginner's mind may have existed, but this is not definitive from this quote. Thus, the only observation about inner value can be said to be {+H}, visualised as:

Participant 10 further reflects,

> "*Certainly in a work place, you have to get on with whoever you work with really. So this is like a good practice, to get to know new people, different people and get along with them and work with them. So I really prefer that, rather than me choosing all my friends. We probably would fit better and be friendly, but I don't think that's the proper way to do it. I think it probably is good haven being chosen rather than choosing your friends. Because you can slack a bit if its only your friends aoo..you'll leave it till whenever. But some people who you are not good friends with will be like ' we need to do this now'. If it weren't for them you are not gonna do it at all. So it's probably, ya, best this group was made of someone else*"[Q10.2].

Step 3.1: Thematic analysis to recognise the arguments made

The participant is comparing past experiences of working with members of their own discipline who are friendly in the sense of being able to understand each other, but the participant gives more importance to team members helping each other by monitoring progress. The argument can be expressed as:

Argument 1/A-10.2: *Regulation of performance by the team helped teamwork.*

The participant explains the added effort for finding common ground is worth it with the reason that, "*some people who you are not good friends with will be like 'we need to do this now'. If it wasn't for them you are not gonna do it at all*". Thus, the team appears to self-regulate, where members monitored each other's contributions vigilantly. Such activity is coded as a 'reflecting' activity, based on Valkenburg and Dorst's (1998) explanation of design activities, where members provide each other with a key structure to work with and deadlines to work against.

Step 3.2: Applying the proposed model of inner values

The quote can be said to show that team A had the inner value of Hopefulness for co-operation, where team members helped each other out. Further, team A appears to have the inner value of Acceptance of situations because peer review by multidisciplinary team members is accepted as necessary by colleagues, "*having been chosen rather than choosing all friends".* The participant can be said to be making judgements about behaviour of team members in phrases such as, "*you can slack a bit if it's only your friends"* and that members

from the same discipline, *"would fit better and be friendly".* However, the audio recording has been re-visited and it is understood that in the phrase the participant does not mean that members of team A were not friendly but the term friendliness seems to be used to describe a common understanding or language. Thus, the phrase, "*people who you are not good friends with, will be like, 'we need to do this now'",* can be said to explain how the participant feels the teamwork during the DfSI project of team A was in-fact effective, even though certain commonalities did not exist. Thus, the team was not judgemental towards each other but had a positive monitoring system during teamwork. Therefore, the inner values observed in quote Q10.2 can be expressed as {+H+A}, visualised as:

The quotes analysed above appear to provide positive insights that teamwork by team A was effective. Now, the quotes being considered appear to refute such effective teamwork by team A as an effect of the multidisciplinary nature of their team.

Participant 1 reflects on the multidisciplinary aspect of team A and mentions that,

> "*One thing I've realised is I think it takes a lot longer to do anything in an MDI team. Just because obviously everyone's got different working styles and they've got different ideas of how they think the project should go because of their own disciplines. It takes a long time to get started. It takes a long time to find a direction and it can sometimes take a long time to decide who's going to do what based on their skills.*" [Q1.1]

Step 3.1: Thematic analysis to recognise arguments made

The participant talks about the differences in the "*working styles*" leading to "*different ideas of how they think the project should go"*. Time invested in finding a common ground causes delays to start the project and delays to the decisions such as finding appropriate direction and deciding roles based on skills, according to this participant. However, the participant speaks hypothetically and this quote does not make it clear if these delays affected the teamwork during the DfSI project by team A. Thus, the next relevant quote is added to make the meaning more clear. Quote 1.2 speaks about the participant's past experiences and is considered not to be relevant, but the participant follows the observation in quote 1.3:

"*That's why I say I found these months quite stressful because I'd say everyone to a certain extent is still stuck in their own disciplines, because that's what they're so used to. And as much as they try and make us multidisciplinary, I think everyone still prefers their own discipline because it's what they have the most knowledge of. I know I definitely do and I still find business methods of working more effective than, say, design thinking*"[Q1.3].

Step 3.1: Thematic analysis to recognise arguments made

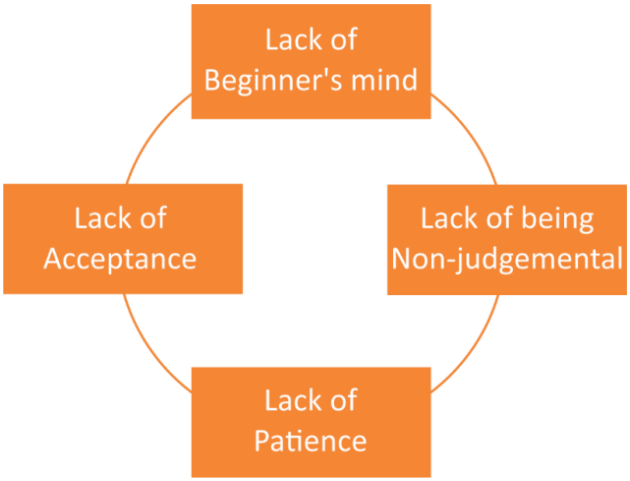
The participant mentions that the members of team A were stuck in their own disciplinary views. The argument is:

Argument 1/A-1.3: *Delays were caused due to extra time required for managing diversity*

The time investment was longer due to the diversity in skills and vision, which was stressful for members of the team. The participant can be said to be explaining 'framing' activities causing delay, because of the lack of common frames within the multi-disciplinary team.

Step 3.2: Applying the proposed model of inner values

The participant explains team members being stuck in their own discipline, which can be said to reveal a lack of the inner value of keeping a Beginner's mind. The participant uses phrases with generalizations such as, "*everyone ... is still stuck in their own disciplines"* and *"everyone still prefers their own disciplines".* These could be interpreted as judgements because, unlike the earlier remarks in quote 1.1, the generalizations are directly related to the teamwork of team A, during the DfSI project. It can now be understood what the participant meant by, "*a long time to get started... a long time to find a direction... a long time to decide* (roles)*",* in quote 1.1. The lack of a Beginner's mind, with a Judgemental attitude creates a perception of delay, which led to the reaction of being stressed before the events could unfold. This can therefore be interpreted as lack of the inner value of Patience. Similarly, the feeling of teamwork during DfSI being "*stressful*" and the confession, "*I know I definitely do and I still find business methods of working more effective than, say, design thinking*", indicates a lack of the inner value of Acceptance of diversity as a situation during the project. Thus, the inner values arising from the quote can be expressed as{-B-N-P-A} and visualised as:



Participant 1 refers to a different issue than the one mentioned in the quote above. He says:

> "*There's ever only been one business student at any point in the team, whereas normally two or three designers. So I think that kind of makes the team dynamic and team construct very design-led. So, I'd quite like to see a more even spread... of business, designers and technologists. Because I think that's the only way you can actually be multidisciplinary because at the minute, there's so many designers, naturally they sort of side with each other, because they think their method of working is preferred. So I don't really see it as multidisciplinary learning because it's just been a couple of months of following designers to a certain extent*" [Q1.4].

Step 3.1: Thematic analysis to recognise the arguments made

The participant implies the negative impact of the multidisciplinary nature of the team by arguing that the opinions of other disciplines were not represented as much as those from Design, but does not provide an explanation of whether the teamwork was affected negatively. Therefore, an argument cannot be explicitly drawn on the effect of the multidisciplinary nature of the team on the teamwork by team A. However, the participant does identify the motive for the creation of the teams as design-led because of the DfSI project.

Step 3.2: Applying the proposed model of inner values

The inner values are not determined because the quote is not considered to be relevant to teamwork by team A.

Participant 12 explains:

> "*In this context, for this social innovation, originally before I started the project, I thought it would be good to have a mix, because it's social and design is not all about socials, so you know, there's business in there, there's also social work in there. But actually, I think if it was all designers, it would have probably gone smoother because everyone's on the same page. Everyone usually, the design teams that I've worked in, in*

the past, have got a base level of understanding, which was missing in this group. So you almost got the foundation and then you couldn't, if you come up with any problems or any lack of knowledge or experience... so I think the makeup of the group to start with was quite difficult... What I was really hoping for was that everyone would really play to their strengths, and take the initiative... but unfortunately that didn't really happen, so it was a bit more like the stronger personalities in the team rather than a stronger skill sets in the team take control, so it wasn't as balanced as I'd like it to be" [Q12.1].

Step 3.1: Thematic analysis to recognise the arguments made

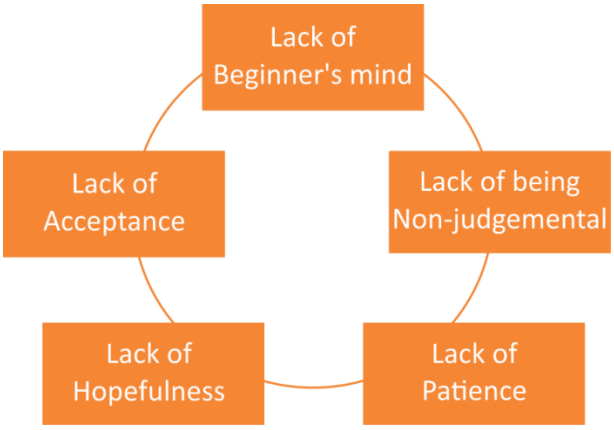
The participant explains how in team A the members from multiple disciplines lacked a common understanding, which made it difficult to start any activity during the DfSI project because the initiative was not always taken by team members with appropriate skills. The argument by the participant can be said to be:

Argument 1/A-12.1: *Initiatives were not always taken by members of the stronger skill-set.*

The ability to take an initiative is dependent on many factors, including but not limited to; 'personality', 'language', 'culture', 'knowledge', 'leadership skills' etc. The participant explains, "*What I was really hoping for was that everyone would really play to their strengths, and take the initiative... but unfortunately that didn't really happen*". Such initiative taken within a team during different activities can be interpreted as a 'framing' and/or 'moving' activity based on Valkenburg and Dorst (1998).

Step 3.2: Applying the proposed model of inner values

The participant's reflections on the teamwork of team A start with, Hopefulness for cooperation, where the participant thought, "*it would be good to have a mix*". However, the lack of a Beginner's mind is seen where the participant expected, "*a base level of understanding*". This expectation led to judgements such as, "*makeup of the group to start with was quite difficult*". This led to a lack of Patience where, "*stronger personalities in the team rather than stronger skill sets in the team* (took) *control*". The participant reflects in the phrase, "*it wasn't as balanced as I'd like it to be*", that can be said to show a lack of Hopefulness for co-operation during teamwork and a lack of Acceptance of the situation. Thus, the participant reveals a lack of; the inner value of a Beginner's mind, being Non-judgemental, Patience, Hopefulness and Acceptance, which can be expressed as{-B-N-P-H-A} and visualised as:



Participant 12 further explains the effect of the multidisciplinary nature of the team and mentions:

> "*People's confidence is one thing, I think because they come from different disciplines, people's skill sets was so far removed. Everyone's work... the skill sets are still so far removed from each other... and personality. You're working with; multidisciplines, multi-personalities, and multi-cultures all in one, which is three big factors, and so trying to find a common working ground on all of that at base level, with the sort of skill level you've got is really hard, so there was more time taken trying to work out what people can do and how people can do it, than actually doing it, which is frustrating*" [Q12.4].

Step 3.1: Thematic analysis to recognise the arguments made

The participant explains that the skills of members of team A were far removed because the team comprised; multidisciplines, multi-personalities and multi-cultures. The argument in this quote can be:

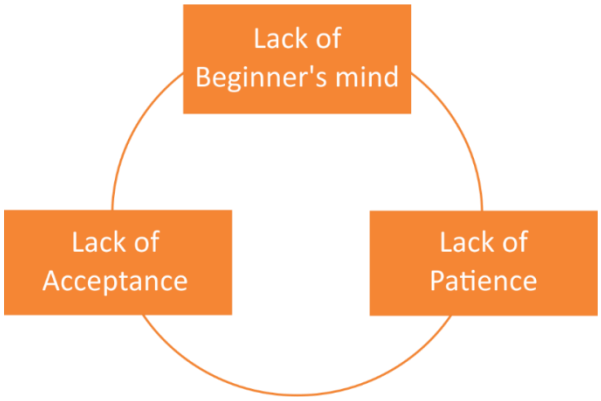
Argument 1/A-12.4: *Delays were due to the time required to handle team diversity*.

Delays were also caused due to, "*trying to find a common ground for teamworking … there were more times taken trying to work out what people can do and how people can do it, than actually doing it, which is frustrating*"(Q12.4). Such activities by the team are coded as 'framing', based on Valkenburg and Dorst's (1998) explanation of design activities, where finding a common frame of reference was difficult, time consuming and often stressful and may have delayed the 'moving' activities in team A, based on the quote.

Step 3.2: Applying the proposed model of inner values

The participant again explains how the team lacked the inner value of a Beginner's due to differences in personalities and differences in cultures in addition to the differences in disciplines, which affected team A during their DfSI project. The participant explains,

finding; "*common working ground on all of that at base level is really hard*", because of the, "*more time taken trying to work out what people can do and how people can do it, than actually doing it".* These sentences show a lack of Patience. The use of the phrase, "*which is frustrating*", can be said to show that there was a lack of Acceptance by team A, due to its multidisciplinary nature during DfSI, or it could have been attributable to the multiple-personalities or multiple-cultures. Thus, the inner values observed in the quote are; a lack of Beginner's mind, Patience and Acceptance, expressed as {-B-P-A} and visualised as:



Participant 12 concludes in the following quote:

> "*If I'd been in a team of skilled designers, I feel I could have delivered a lot more. But I was happy with what we delivered at the end, you know, what we delivered was good, and despite our differences, we did rally together and came up with the goods at the end, but it was a struggle, if I'm honest. It was a struggle, so I think we did our best as a group with what we could have done in a team, but I think in that time if I was working with people that I've worked with in the past, just in terms of designers, it would have been a lot more effective, just because almost they're more narrow minded and they're all on the same page*" [Q12.5].

Step 3.1: Thematic analysis to recognise the arguments made

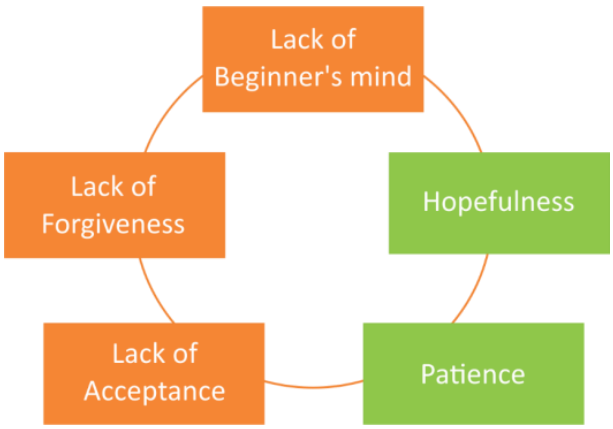
The argument presented can be interpreted as:

Argument 1/A-12.5: *Struggles due to diversity did not affect design outcomes.*

The participant mentions: "*despite our differences, we did rally together and came up with the goods at the end, but it was a struggle, so I think we did our best as a group with what we could have done in a team*". This appears to denote that 'moving' activities, as explained by Valkenburg and Dorst (1998) were difficult but ultimately successful.

Step 3.2: Applying the proposed model of inner values

The participant mentions phrases such as, "*despite our differences, we did rally together*" and "*we did our best as a group*", which show Hopefulness for co-operation during the teamwork by team A. The participant mentions, "*despite our differences, we did rally together*", which can be said to show the inner value of Patience. However, the participant can be said to show a lack of the inner value of Acceptance of others' views in the wishful thinking seen in the phrase, "*If I'd been in a team of skilled designers*" and the use of phrases such as "*it was a struggle*". In fact, the participant repeats the phrase "*it was a struggle*", which indicates a lack of Forgiveness. The participant adds to findings that, multi-disciplinary working needs to be practiced with Hopefulness for co-operation and because team A did this, their teamwork created satisfactory outcomes. However, the participant can be said to show a lack of Acceptance of other's views leading to a lack of Forgiveness. Thus, the inner values observed were {-B+H+P-A-F}, visualised as:



Step 4 can now be applied to combine these identified arguments into meta-arguments and combine identified inner values with these meta-arguments.

Step 4: Finding meaning in language for Subsection 1/A

Step 4.1: Combining arguments from the thematic analysis to create meta-arguments

The team shared a vision of project teamwork within the first week (See argument 1/A-3.2: *The team invested in the development of a shared plan, which organized different aspects of teamwork*). The team members trusted each other's abilities and commitments, which is coded as a 'framing' activity conducted by the team (See argument 1/A-5.2: *Development of trust helped to share responsibilities during teamwork*). Such 'framing' activity around diversity of the multidisciplinary team seems to have helped during 'moving' activities (argument 1/A-3.1: *The team shared skills and information with each other during teamwork*), where design ideation is described as being radical (Q10.1). The meta-argument that can be said to emerge about the teamwork by members of team A during DfSI project seems to be, '*In team A, different disciplines complemented each other and shared responsibilities for the project*'.

Further, the team members shared ideas (See argument 1/A-3.21: *Open communication and discussion of ideas helped teamwork*) during 'moving' activities along with 'reflecting' activities on possible solutions to the DfSI project. The members resolved inter-personal issues within the team through open communication and discussions (See argument 1/A-3.26: *Problem solving through confidence in open communication helped teamwork*). The discussions for resolving interpersonal issues can be coded as 're-framing' activities. Thus, the 'moving', 'reflecting' and 'reframing' activities appear to lead to the meta-argument that '*In team A, open communication within the team helped share ideas, discuss and solve problems*'.

Within team A, the team members monitored each other's progress (See argument 1/A-10.2: *Regulation of performance helped teamwork*), providing deadlines and feedback, which can be considered as 'moving' and 'reflecting' activity and such activities led to personal development for members of team A (See argument 1/A-10.1: *Exchange of skills was possible due to multidisciplinary team members*). Such 'moving' and 'reflecting' activities reveal meta-argument that, '*In team A, the multidisciplinary nature of the team provided unique learning opportunities for personal growth*'.

On the other hand, the team members explain that extensive time was required for 'framing' activities to deal with the diversity of the multidisciplinary team, which was stressful (See Argument 1/A-1.3: *Delays were caused due to extra time required for managing diversity*).Prolonged framing activity also led to delays to the 'moving' activities during the DfSI project and this was a struggle for some team members (See argument 1/A-12.4: *Delays due to management time required to handle diversity in disciplines*). Initiatives in tasks was sometimes taken up by members with stronger personalities rather than those with stronger skill-sets (See Argument 1/A-12.1: *Initiatives were not always taken by members of the stronger skill-set*) and though this did not affect the design outcomes of the DfSI project, it increased the difficulty of the design process due to multidisciplinary teamwork (See Argument 1/A-12.5: *Struggles due to diversity did not affect design outcomes*). Thus, the meta-argument can be said to be '*Team A had to create a shared understanding, which was time consuming and felt taxing to certain members while working in team during the DfSI project*'.

Step 4.2: Combining observations from the model of inner values with meta arguments from the thematic analysis

The meta-arguments provide an outline to extrapolate inner values demonstrated at the quote level, to determine the inner values at the team-level. The meta-arguments supporting effective teamwork by team A with regard to the multidisciplinary nature of the team are discussed first and then those refuting effective teamwork by team A are discussed.

Meta-Argument 1: '*In team A, different disciplines complemented each other and shared responsibilities of the project*'

Evidentiary quote: Q 3.1, Q3.2, Q5.2 and Q 10.1.

Brief summary of findings from the thematic analysis: Framing activities helped the team build actions where the weaknesses of a discipline were compensated by the strengths of others (Q3.2). Further, the team members trusted each other during 'moving' activities to share their disciplinary views for teamwork during the DfSI project (Q 5.2).

Inner values observed in the data: Inner values have mostly been evaluated one at a time here. However, multiple inner values are presented together when they can be evaluated together with expediency.

Inner value: Hopefulness for co-operation (Q3.2, Q5.2, Q10.1)

Evidence: The thematic analysis revealed that the team members were able to initiate co-operation and create shared 'frames' where they mutually distributed their responsibilities and relied on each other's disciplinary expertise during 'moving' activities for the success of their DfSI project. Thus, the data reveals evidence of Hopefulness for co-operation in team A during the different 'framing' and 'moving' activities, which matches with the observations made by applying the proposed model of inner values.

Finding: The observation of Hopefulness is confirmed as the inner value for the team (Q3.1, Q3.2, Q5.2, and Q10.1).

Inner value: being Non-judgemental (Q3.1)

Evidence: The observation made by applying the proposed model of inner values on quote Q3.1, can be said to show one of the members of the team reflecting on 'framing' activities undertaken by their team and explains their team's decisions were based on the needs of the project. This was considered as non-judgemental, but it is the member of the team who reflected objectively. However, the evidence is not clear whether the inner value of being Non-judgemental was an inner value of the entire team or just of that particular member during the DfSI project.

Findings: the team may have exhibited the inner value of being Non-judgemental during teamwork for the DfSI project.

Inner value: Acceptance (Q3.2)

Evidence: The observation of the inner value of Acceptance comes from an understanding arising from the supporting study, where expert DfSI design practitioners considered the judgement of one's own weakness as a necessary step to accept shortcomings. The team accepted their disciplinary shortcomings, divided responsibility and discussed progress frequently and freely. The participant explains this with multiple examples of 'framing' and 're-framing' activities during their DfSI project. Thus, the observation made from applying the proposed model of inner values appears valid.

Findings: the inner value of Acceptance is verified from the evidence (Q3.2).

<u>*Meta-Argument 2*</u>: '*In team A, open communication within the team helped share ideas, discuss and solve problems*'

<u>Evidentiary quote</u>: Q 3.21 and Q3.26.

Brief summary of findings from the thematic analysis: Open communication within the team helped 'moving' activities such as sharing ideas and helped 'reflecting' activities of discussing such ideas (Q 3.21). Open communication also helped in resolving interpersonal issues (Q 3.26) which may be coded as 're-framing' activities.

Inner values observed in the data:

Inner value: Hopefulness for co-operation (Q3.21, Q 3.26)

Evidence: The open communication during 'framing' activities appear to be due to the inner value of Hopefulness for co-operation and this in-turn had an effect on open communication during possible 'reflecting' and 'reframing' activities. Thus, the observation made by applying the proposed model on inner values is valid.

Findings: Hopefulness for co-operation is an inner value of the team (Q3.21, Q 3.26).

Inner value: Acceptance (Q 3.21, Q3.26).

Evidence: The act of sharing and discussing ideas, coded as a 'moving' activity, and the act of deliberating as a team, coded as a 'reflecting' activity, were possible due to open communication. Such activities are associated with the inner value of Acceptance of other team members' ideas and opinions (Q3.21) and acceptance of challenges during deliberation by other members of the team (Q3.26). The inner value of Acceptance is also seen during the 're-framing' activities, where the members of team A resolved inter-personal issues (Q3.26). Thus, the observation made by applying the proposed model of inner values that, team A had the inner value of acceptance of the situation, can be said to be valid.

Findings: Acceptance is an inner value of the team (Q 3.21, Q3.26)

Meta-Argument 3: '*In team A, the multidisciplinary nature of the team provided unique learning opportunities for personal growth*'

Evidentiary quote: Q 10.1 and Q10.2.

Brief summary of findings from the thematic analysis: the multidisciplinary nature of the team presented unique learning opportunities for personal growth through the 'reflecting' activities. Such reflecting activities are associated with the development of personal skills to handle the future work place (Q10.1). Learning also was possible during the 'moving' activity because the team members for different disciplinary backgrounds helped to provide structure, plan and deadlines and monitored each other's progress closely (Q10.2).

Inner values observed in the data:

Inner values: Hopefulness (Q10.1, Q10.2) and Acceptance (Q10.1)

Evidence: The participant has made an important argument that a person does not get to choose who to work with at the work place and the ability to get along with people is an important skill, which the study can be said to show was learnt through 'reflecting' activities leading to personal development. Such ability appears to be associated with the inner value of Hopefulness for co-operation during teamwork and also in the future. The team members also offered each other structure and deadlines and monitored each other's progress during the team's 'moving' activity, which can be said to show that the team accepted each other's opinions and support. Because this attitude existed during the DfSI project, the inner value of Hopefulness for co-operation and Acceptance of the situation appears to exist during teamwork by members of team A and the observations made by applying the model of inner values can be considered to be valid.

Findings: The inner values of Hopefulness and Acceptance existed in team A (Q10.1 and Q10.2).

Meta-Argument 4: '*Team A had to create a shared understanding, which was time consuming and felt taxing to certain team members during the DfSI project*'

Evidentiary quote: Q 1.3, Q12.1, Q12.4 and Q12.5.

Brief summary of findings from the thematic analysis: The 'framing' activities for organizing the teamwork took a lot longer than expected, which some members of team A found difficult (Q1.3 and Q12.4). The team members mention that initiatives were not always taken by subject experts (Q12.1), which was not expected. However, this did not affect the outcomes designed by team A, some members of the team struggled during the project because of the multiple disciplines involved in the DfSI project (Q12.5).

Inner values observed in the data:

Inner value: lack of Beginner's mind (Q1.3, Q12.1, Q12.4)

Evidence: The 'framing' activity took a long time because team members had different disciplinary expertise (Q1.3) and this diversity made it difficult to find a common ground or a common 'frame' of reference for the team. Thus, the team can be said to lack the inner value of a Beginner's mind, which led to delays during the DfSI project. The observation made by applying the proposed model of inner values can therefore be considered a valid observation.

Findings: The lack of a Beginner's mind is an inner value for the team (Q1.3, Q12.1, Q12.4).

Inner value: lack of being Non-judgemental (Q1.3, Q12.1).

Evidence: When applying the proposed model of inner values, the use of generalizations was used to denote certain phrases, which can be said to show that there Isa lack of the inner value of being Non-judgemental (Q1.3, Q12.1). However, the delay due to the 'framing' activity suggests that the team used these judgements to manipulate their own weakness and build strength by sharing knowledge. The survey with expert design practitioners recognises this as an important part of the design process and therefore the observation of a lack of the inner value of being Non-judgemental could be considered of low consequence to teamwork during the DfSI project.

Findings: The team may have lacked the inner value of being Non-judgemental.

Inner value: lack of Patience (Q1.3, Q12.1, Q12.4).

Evidence: 'Framing' activities required additional time and effort than the team members expected. They mention this as a cause of anxiousness (i.e.; struggle- Q12.4 and stressful- Q1.3). One of the consequences of such delays on teamwork was that stronger personalities took the initiative to avoid delays, rather than the subject experts (Q12.1). This appears to indicate a lack of the inner value of Patience in the team. Thus, the observation of a lack of patience made by applying the proposed model of inner values is valid.

Findings: The lack of the inner value of Patience is an inner value for the team (Q1.3, Q12.1 and Q12.4).

Inner value: lack of Acceptance (Q1.3, Q12.1, Q12.4).

Evidence: Some of the drawbacks of the multidisciplinary team structure in team A have been explained as a lack of a common 'frame' of reference (mentioned in Q12.1), the investment of a long-time to create such common frames, leading to delays in the 'moving' activities (Q12.4) and causing the DfSI project to become design-led rather than multidisciplinary (Q1.3). These steps and the associated stress and anxiety were considered unnecessary by the members of the team. However, these activities could be considered important during the DfSI project and the team members appear to show a lack of the inner value of Acceptance. Thus, the observation made by applying the proposed model of inner values is considered to be valid, that the team lacked the inner value of acceptance of the situation.

Findings: Lack of Acceptance is considered an inner value for the team (Q1.3, Q12.1).

Summarization of Findings and observation for Subsection 1/A

Thematic analysis

The findings from the thematic analysis reveal several arguments, which lead one to derive four meta-arguments. They are:

Meta-argument 5. '*In team A, different disciplines complemented each other and shared responsibilities of the project*'.

The team shared a plan for their teamwork by investing in 'framing' activities during the first week of the DfSI project (See argument 1/A-3.2) and created trust, which has been interpreted as a 'frame' on which teamwork was based (See argument 1/A-5.2). Such 'framing' activities around the diversity of the multidisciplinary team seems to have helped the team during 'moving' and 'reflecting' activities such as ideation and discussion (argument 1/A-3.1).

Meta-argument 6. '*In team A, open communication within the team helped share ideas, discuss and solve problems*'.

By conducting 'reflecting' activities through open and honest communication, the team members could conduct 'moving' activities effectively, such as sharing and discussing ideas (See argument 1/A-3.21) and 're-framing' teamwork by resolving inter-personal issues (See argument 1/A-3.26).

Meta-argument 7. '*In team A, the multidisciplinary nature of the team provided unique learning opportunities for personal growth*'.

The team members conducted 'reflecting' activities by monitoring each other's progress, providing deadlines and feedback (See argument 1/A-10.2), which aided further 'reflecting' activity at personal level which is required for personal professional development (See argument 1/A-10.1).

Meta-argument 8. '*Team A had to create a shared understanding, which was time consuming and felt taxing to certain members during the DfSI project*'.

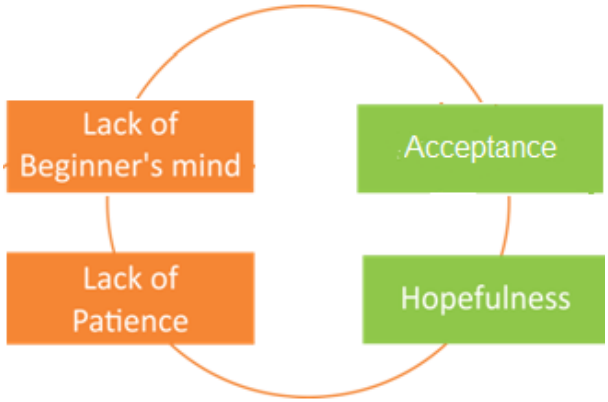
The team spent an extensive amount of time and effort developing a common 'frame', to be able to deal with the multidisciplinary nature of their team, which was stressful at times (See argument 1/A-1.3). This caused delays to the subsequent 'moving' activities and felt like a

struggle for certain members of the team (See argument 1/A-12.4). At times, this led to stronger personalities rather than those with stronger skill-sets taking initiative during a task (See Argument 1/A-12.1) and though this did not affect design outcomes of the DfSI project, it increased difficulty in the design process due to the multi-disciplinary nature of the team (See Argument 1/A-12.5).

Inner values

The arguments reveal that the team perceive their initial 'framing' activities to be essential for effective use of diversity of their multidisciplinary team, for trust and open communication and for the development of personal professional practice. The first three arguments can be said to consistently reveal the inner values of 'Hopefulness' (Q3.1, Q3.2, Q 3.21, Q3.26, Q5.2, Q10.2 and Q12.1) and 'Acceptance' (Q3.2, Q 3.21, Q3.26, Q1.3, Q1.4, Q12.1 and Q10.2) existed within their team. However, the fourth argument reveals certain weakness within teamwork as perceived by the team members. The delays, due to extended 'framing' activities, caused anxiousness and stress and have affected the 'moving' activities, where the initiative was not always taken by the most knowledgeable team member. Such drawbacks reveal that the team may have lacked the inner values of; 'Beginner's mind', which caused delays and may have lacked the inner value of 'Patience' when the initiative was taken by someone with a stronger personality, rather than a stronger skill-set. Based on these observations, the diagrammatic representation of inner values of team A with regard to the multidisciplinary aspect can be expressed as {+H+A-B-P} and visualised as:.

Figure 7: Inner values of team A towards Multidisciplinary teamwork during the DfSI project



Reflection

The members of team A reflected on the multidisciplinary nature of their team. They seem to focus primarily on the advantages and disadvantages around ‘framing’ and ‘reflecting’ activities conducted by their team and they seem to agree that their ‘framing’ activities, though challenging, had an overall positive effect on their teamwork during the DfSI project. The team can be said to express effective use of diversity of multiple disciplines during the ‘moving’, ‘reflecting’ and ‘re-framing’ activities that followed the initial ‘framing’ activity. Such ‘framing’ activities appear to be stressful and challenging due to the diversity of the multidisciplinary team.

1.1.2 Analysis of team B

Step 3: Making Observation for Subsection 1/B

Participant 2 mentions that conflicts while working in team B were not because of multi-disciplinarity aspect but between members from the same discipline, specifically the designers. According to the participant, members from the same discipline know the same process and want their own suggestions to be chosen by the team. The participant reflects,

> *"Especially with designers, there'll just be too much conflict, because everyone would want their ideas to come to fruiti-tion."*[Q2.1]

However, this is a general insight and not a quote specifically on team work during DfSI project of team B. However, the participant's judgment about designers is based on experiences during team work during DfSI project in team B. The participant explains,

> "*At the beginning it was hell for me, the two designers made it hell for me because it was like, I don't know if I'd shot myself in the foot when I said I didn't like the project, and that just like come back to haunt me. But I don't think that should have even affected it, affected my contribution at all, because they just seemed to not want to accept anything I said, or any suggestions I made, for no reason, not that it made sense, everything I was saying was just logical and made perfect sense, but they just kept saying, 'Oh no, it doesn't make sense. It's not relevant. It's not'*" [Q2.4]

Step 3.1: Thematic analysis to recognise arguments made

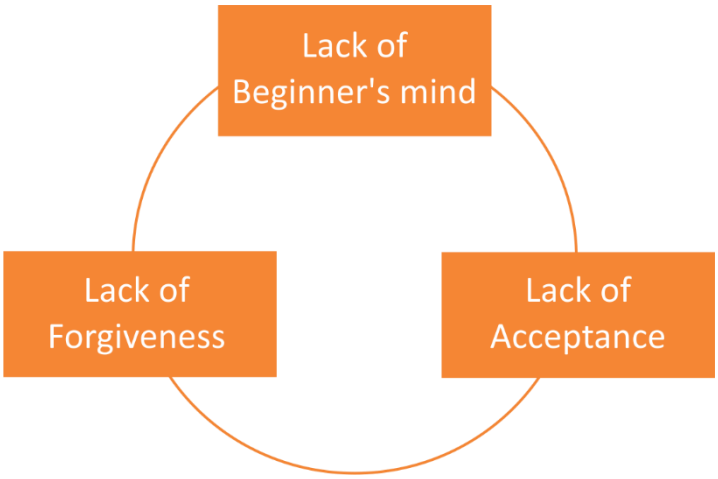
The participant explains the conflict within team B and presents the argument:

<u>Argument 1/B-2.4</u>: *Suggestions of team members were not considered.*

The participant mentions "*they just seemed to not want to accept anything I said*". The participant talks in Q2.1 about ideas which is 'moving' activity according to Valkenburg and Dorst's (1998) explanation. However, in Q2.4 the participant does not mention any specific stage. The participant briefly mentions "*I'd shot myself in the foot when I said I didn't like the project*" which is a 'frame' that the participant speculates was used by other team members. However, the term "*suggestions*" suggests 'naming', 'framing' and 'moving' activities. Such problems affected discussion where 'reflecting' activities could have occurred, which can be seen in the phrase "*'Oh no, it doesn't make sense. It's not relevant. It's not'*".

Step 3.2: Applying model of inner values

The participant anticipates the lack of Beginner's mind of other team members, who could not let go the preconception that the participant "*didn't like the project*". There is a lack of inner value of Acceptance of other's views in team B as seen in the phrase "*they just seemed to not want to accept anything I said*". This may be due to shooting self "*in the foot when* (saying) *didn't like the project*" as the participant anticipates. lack of inner value of Forgiveness is seen in the repeated use of the phrase "*It's not*". Thus the findings can be expressed as {-B-A-F} and visualised as:



Participant 6 talks about multi-disciplinarity aspect in quote 6.1. The quote is very long but it cannot be divided because it presents different evidence to one argument. The participant mentions,

> "*I mean there's always going to be cases where some people take the lead and maybe do a little bit more, but in this case, yeah, it was very sort of weighted, like effort. Like the designers do a lot more, it seems, than the other members, because, especially ours was a social innovation project, so ... you know, technology, it was like, where did it step in? So, I mean obviously it could be your perspective, but yeah, I felt there was a lot more work for the designers during the project... Especially because a lot of this was about the design process as well, talking about the design process I have worked with a multi-disciplinary team and a design team now, and just from experience, sort of, you all know what you're talking about and I think, I don't know, it's like ... I guess there's some sort of language or something that you just sort of get, because you know if you say, 'Oh, do me a visualisation', you can do it and they'll come back and they know that you might not know what it looks like, but then will just go and do it, and a*

team that ... It just seems easier, because it seems to be the sort of language that everyone shares, "Yeah, I know how to do that. I'll do that bit", and it just seems a lot easier. So when you're in a team of designers, you've all done that so many times, and the iteration bit, you get it all and you get why you're going back and round and round but from an outside perspective, I guess like in business, what we found was that when they first started they were saying they just had an idea, dealt with one idea, that was it. In design, you all come up with loads of ideas, don't you, and then you all narrow them down and then start to iterate. But then they (non-designers) *would just, 'Yeah. Do that'. It's a different process, 'cause obviously we've learnt this process so we just continue it.*" [Q6.1]

Step 3.1: Thematic analysis to recognise arguments made

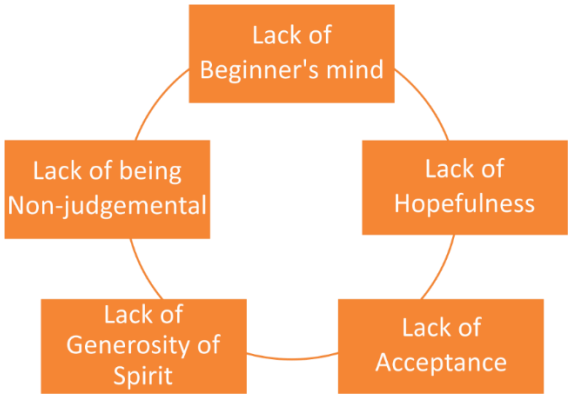
Participant 6 mentions that the project of team B was "*a social innovation project*" with "*a lot of... the design process*". The quote can be said to argue

Argument 1/B-6.1: *Difference in disciplinary knowledge led to more workload on designers*

The participant talks about "*some sort of language*" which is frames that designers share but other disciplines may not. The participant reflects on "*visualization*" and "*generating loads of ideas*" which are 'moving' activities. Thus, the participant mostly reflects on the 'moving' activities suffering due to lack of common frames between multi-disciplinary team members.

Step 3.2: Applying model of inner values

The participant uses phrases such as "*designers do a lot more*" in "*social innovation project*" can be said to show that the participant and the team had preconceptions about how the team work during DfSI project would be like. This can be said to show the lack of Beginner's mind for the team. The Beginner's mind is also seen in the phrase "*technology, it was like, where did it step in?*" which also can be said to show the can be said to show lack of Hopefulness for co-operation. With other disciplines. The next phrase used is "weighted" workload which is another way of saying uneven work load which can be said to show the lack of inner value of Acceptance. The participant mentions "*just seems easier*" which can be said to show a lack of Generosity of spirit. The generalizations about different disciplines can be said to show the lack of inner value of being Non-judgemental. Thus, the findings can be expressed as {-B-A-N-H-G} and visualised as:



Participant 6 further mentions,

> "*I felt miserable. Everyone else here had really good teams who were working together really well and then I didn't feel like ours was at all... I didn't. I just sort of, I felt like I was doing the majority of the work, like I was sort of pulling the weight, "Oh, you'll need to do this, do that", I was like, "I'm trying to tell them", trying to tell other people what to do. I think it was a lot harder than what everyone else realised. Yeah, it was quite depressing.*"[Q6.10]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains her misery due to uneven workload and inability of team members to contribute. The argument presented can be said to be:

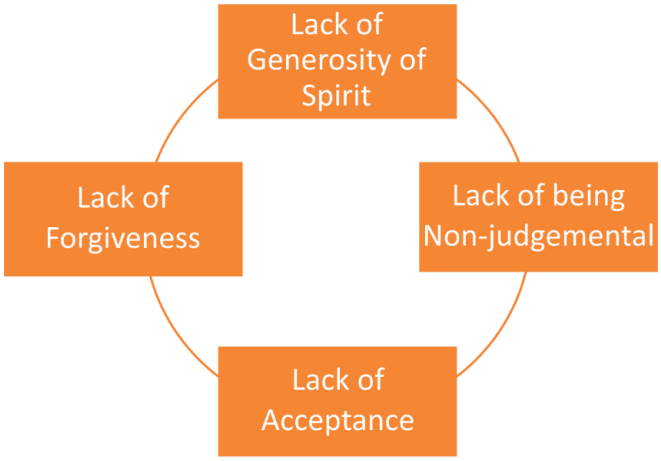
Argument 1/B-6.10: *Inter-personal problems and inability of team members led to uneven workload.*

The participant talks about "*pulling the weight*" but does not specify which activity was the one where she "*was doing the majority of the work*". If the participant talks about organization of workload and activities, which is 'framing' activity, but if the participant talks about gathering information, creating ideas, generating solutions then those could be coded as 'moving' activities. The participant definitely does not mention understanding the design problem that the DfSI project worked for and therefore the participant cannot be said to be talking about 'naming' activity. Similarly, the participant does not talk about 'reflecting' activities either.

Step 3.2: Applying model of inner values

The participant can be said to show the perception of not accepting larger share of the cost of co-operation which is the lack of the inner value of Generosity of spirit. Therefore, the

participant felt that "*Everyone else here had really good teams*". This can be said to show the lack of the inner value of Non-judgemental being. The participant believed that the team was not working together "*at all*" which can be said to show lack of Acceptance. The participant mentions that the uneven distribution of work load in team B was the reason why most of the time the participant felt "*miserable*" and the situation felt "*depressing*". The repetition of these phrases can be said to show lack of Forgiveness. Thus the inner values observed include {-G-N-A-F}, visualised as,



Participant 11 mentions

> "*I know multi-disciplinary has its strengths and its weaknesses. But personally I am more comfortable with my own discipline. I mean, I rarely have to explain or defend my views. Here, you have to always explain and debate. It's so hectic here. If I had to do this project my way, it would be different. I know it would be better. Because most of our time went in resolving conflicts, so that didn't help.*"[Q11.1]

Step 3.1: Thematic analysis to recognise arguments made

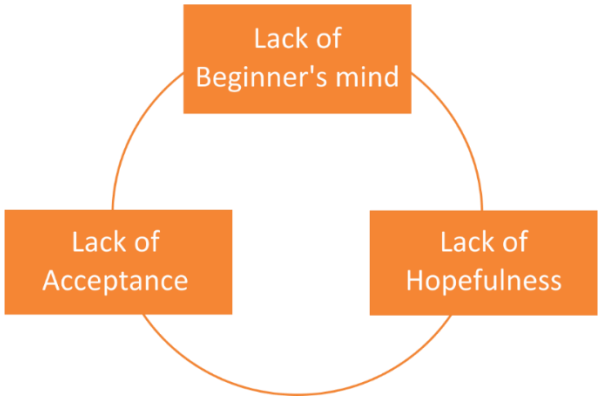
The participant mentions "*most of our time went in resolving conflicts*" and that within multi-disciplinary team members "*always* (have to) *explain and debate. It's so hectic*". The participant can be said to argue that

Argument 1/B-11.1: *Time was wasted in resolving conflicts, defending viewpoints and debating.*

The participant does not clearly mention which activity such conflicts and debates occurred. The participant could be talking about 'naming', 'framing' or 'moving' activities but because he does not mention learning, the participant may not be talking about 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant says "*I am more comfortable with my own discipline*". This may be completely valid choice for the participant, but during team work during DfSI project it can be said to show lack of Beginner's mind and lack of Hopefulness for co-operation. The participant further can be said to show lack of Acceptance when he mentions "*my way it would be different. I know it would be better*". The repetition of the phrase "*explain or defend views"* and "*explain and debate"* can be said to show lack of Forgiveness that the participant brought to the team. Thus, inner values observed can be said to be {-B-H-A}, visualised as:



Step 4: Finding meaning in language for Subsection 1/B

Step 4.1: Derivation of meta-level understanding from thematic analysis

When the participants reflect on team work, the focus seems to be either on team discussion or on work distribution. The team could not discuss effectively because suggestion from all members of the team were not given importance (See Argument 1/B-2.4: *Suggestions of team members were not considered*). Similarly, the team also could not discuss effectively because of inter-personal problems, prolonged debates and the need to defend own viewpoints (See Argument1/B-11.1: *Time was wasted in resolving conflicts, defending viewpoints and debating*). The meta-argument that seems to emerge from such arguments is that '*In team B, team discussions were not productive because of inter-personal conflict suggestions were not heard, discussions were prolonged and viewpoints needed vigorous defending.*'

The work within team could not be distributed properly because every discipline could not contribute to the design process (See Argument 1/B-6.1: *Difference in disciplinary knowledge led to more workload on designers*). The team workload could not be evenly distributed between the members because they had interpersonal problems and inability of certain team members to contribute effectively (See Argument 1/B-6.10: *Inter-personal problems and inability of team members led to uneven workload.*) Thus, the meta-argument that can be said to emerge is that '*In team B, every discipline could not contribute due to lack of relevant knowledge or inter-personal difference leading to an uneven workload*'.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1:'*In team B, team discussions were not productive because of inter-personal conflict suggestions were not heard, discussions were prolonged and viewpoints needed vigorous defending.*'

Evidentiary quote: Q2.4, Q11.1

Brief summary of findings from thematic analysis: Lack of common frames or what a participant calls "*shared language*" may have led the team to the struggle with each other during 'naming', 'framing' and 'moving' activities.

Inner value observed in the data:

Inner value: lack of Beginner's mind (Q2.4, Q11.1), lack of hopefulness (Q11.1), lack of Acceptance (Q2.4, Q11.1), lack of Forgiveness (Q2.4)

Evidence: The team members mention that the pre-conceptions about each other affected the ‘framing’ and ‘moving’ activities during team design (Q2.4). Though there were prolonged discussions according to the team members these discussions were not productive towards design process (Q11.1). The pre-conceptions hindered the creation of common ‘frames’ for team members to share their contribution to the project. Such pre-conceptions require open-mind which is the interpretation of the inner value called Beginner’s mind during this research.

A team member mentions personal choice and comfort with members of same discipline. By applying proposed model of inner value, such phrase depicts lack of hopefulness. But it seems this is the inner value of participant during interview rather than the team work during DfSI project. Thus, this may or may not be true inner value for the team. However, another participant mentions that team could not work together from the beginning of the DfSI project due to something that was said by one of the members of the team which was held against the team member and affected team work negatively. Such evidence confirms that the activities by different team members were not co-operative. This leads to a logical derivation that the team may have lacked hopefulness for co-operation in their team work during the DfSI project.

The data can be said to show that team members could not accept each other’s opinions and suggestions. This may be because of ‘lack of common frame’ or ‘difference is frames’ applied by different members of the team. The team members do not clearly state if such lack of Acceptance was part of a few phases during the DfSI project and they use phrases such as ‘all the time’ which leads to the finding that lack of Acceptance may have frequently occurred throughout the different activities during the project. The observation of lack of acceptance made by applying the proposed model of inner values is validated by the thematic analysis.

The team members mention the discussions and disregard of opinions as reasons for inter-personal problems throughout the project. The consequence was dysfunctional team work during the DfSI project because the members could not let go their team’s misgivings. This may be interpreted as lack of forgiveness. The effect of the dysfunctional team work during DfSI project has not been specified to a specific activity and as discussed in paragraph above, the data seems to suggest that it may have affected various activities frequently. The evidence of lack of acceptance and lack of forgiveness for thematic analysis is very similar, but the model of inner values helps specify the two inner values separately based on separate evidences.

Findings: The lack of Beginner's mind (Q2.4, Q11.1), lack of hopefulness (Q11.1), lack of Acceptance (Q2.4, Q11.1), lack of Forgiveness (Q2.4) are inner values of the team.

Meta-Argument 2: '*In team B, every discipline could not contribute due to lack of relevant knowledge or inter-personal difference leading to an uneven workload*'

Evidentiary quote: Q6.1 and Q6.10

Brief summary of findings from thematic analysis: The team members had different disciplinary background and the contribution of disciplines other than design was considered to be minimal because of the nature of the project being DfSI. Such team members had to be told what to do and even then such team members could not contribute effectively according to the data. The participant seems to be talking about such incidences primarily during 'framing' and 'moving' activities pertaining to deciding and doing acts during the DfSI project.

Inner value observed in the data: lack of Beginner's mind (Q6.1), lack of Hopefulness (Q6.1), lack of being non-judgemental (Q6.1, Q6.10), lack of Acceptance (Q6.1, Q6.10), lack of Generosity of spirit (Q6.1, Q6.10) and lack of Forgiveness (Q6.10)

Evidence: The pre-conceptions about other disciplines have been used as evidence for lack of beginner's mind when proposed model of inner values is applied to the data. The thematic analysis can be said to show that 'frames' based on pre-conceptions about other disciplines led to uneven distribution of workload and exasperated the inter-personal problems where team members did not take initiative required for 'moving' activities. Thus, such frames can be said to be based on the lack of Beginner's mind.

The 'frames' based on belief that disciplines other than design could not contributed to the DfSI project have been mentioned to have led to uneven distribution of work load during further 'framing' activities and inter-personal problems during 'moving' activities. Thus, it could be interpreted that initial 'frames' may have caused a lack of hopefulness for co-operation. Thus, this finding from thematic analysis verifies the lack of the inner value Hopefulness for co-operation in the team work during DfSI project.

The judgements made by the participant could be deemed important to understand diversity and to take positive steps. Thus, it is not certain if the judgemental attitude was lacking in team work during DfSI project.

The diversity created 'frames' which were not accepted leading to interpersonal problems and thus, the lack of Acceptance of situation could be said to be inner value in

team work during DfSI project. Thus, the observation made by applying proposed model of inner values is justified through thematic analysis.

During ‘moving’ activities the members with extra workload tried to get help from team members by re-distributing specific tasks. The member explains this did not happen. This may be interpreted as the lack of generosity of spirit and/or lack of forgiveness on part of the team. The observation of lack of generosity of spirit and lack of forgiveness was based on the participant not accepting larger share of responsibility during DfSI project, but the thematic analysis reveals that lack of generosity and lack of forgiveness may have been inner value of team which affected ‘moving’ activities where workload could not be re-distribute effectively.

Findings: lack of Beginner’s mind (Q6.1.), lack of Hopefulness (Q6.1), lack of Acceptance (Q6.1, Q6.10), lack of Generosity of spirit (Q6.1, Q6.10) and lack of Forgiveness (Q6.10) can be said to be recognised as the inner values of the team and the lack of inner value of being non-judgemental (Q6.1, Q6.10) cannot be confirmed as inner value of the team.

Summarization of Findings and observation for subsection 1/B

Thematic analysis

Two meta-arguments could be said to be derived from the data on team work by members of team B during DfSI project:

Meta-argument 1. '*In team B, team discussions were not productive because of inter-personal conflict suggestions were not heard, discussions were prolonged and viewpoints needed vigorous defending.*'

The members of team B could not communicate effectively during 'naming', 'framing' and 'moving' activities which may be because suggestions from some members of the team were ignored by other members (See Argument 1/B-2.4: *Suggestions of team members were not considered*). The team work was also not considered effective by members of team B because the team faced inter-personal problems, prolonged debates and the need to defend own viewpoints through different activities during DfSI project (See Argument1/B-11.1: *Time was wasted in resolving conflicts, defending viewpoints and debating*).

Meta-argument 2. '*In team B, every discipline could not contribute due to lack of relevant knowledge or inter-personal difference leading to an uneven workload*'.

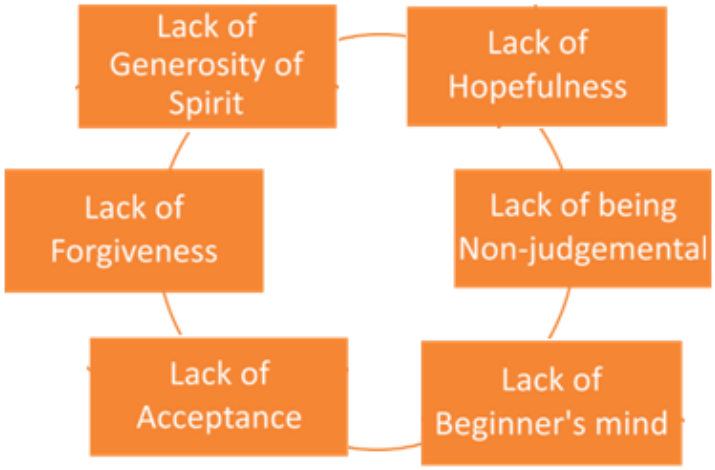
Diversity of multiple disciplines may have caused workload to be unevenly distributed between members of the team because not every discipline was considered to be useful (See Argument 1/B-6.1: *Difference in disciplinary knowledge led to more workload on designers*). The uneven workload was also a result of inter-personal problems and lack of ability of certain team members (See Argument 1/B-6.10: *Inter-personal problems and inability of team members led to uneven workload*).

Inner values

The members of team B could not communicate effectively during 'naming', 'framing' and 'moving' activities which may be because suggestions from some members of the team were ignored by other members (See Argument 1/B-2.4: *Suggestions of team members were not considered*) which showed lack of beginner's mind, lack of acceptance and lack of forgiveness. The team work was also not considered effective by members of team B because the team faced inter-personal problems, prolonged debates and the need to defend own viewpoints through different activities during DfSI project (See Argument1/B-11.1: *Time was*

wasted in resolving conflicts, defending viewpoints and debating) This showed additional inner values such as judgemental behaviour during team work along with lack of hopefulness and generosity. Thus, the overall inner values of the team can be said to be lack of Beginner's mind (Q2.4, Q11.1 and Q6.1.), lack of Hopefulness (Q6.1 and Q11.1), lack of Acceptance (Q2.4, Q11.1, Q6.1 and Q6.10), lack of Generosity of spirit (Q6.1, Q6.10), lack of being non-judgemental and lack of Forgiveness (Q2.4, Q6.10), visualised as:

Figure 8: Inner values of team B towards Multidisciplinary teamwork during the DfSI project



Reflection

The members of team B reflected primarily on the disadvantages of the multi-disciplinary nature of their team and focused on different causes of inter-personal problems within the team. The data can be said to show that team members could not accept each other's opinions and suggestions. This, according to the data, may be because of 'lack of common frame' or 'difference is frames' applied members of the team from different disciplines. This is what a participant calls "*lacking shared language*" which may have led the team to the struggle with each other according to the data. Further, the contribution of disciplines other than design was considered to be minimal because of the nature of the project being DfSI. This was considered another cause for inter-personal problems. Different team members use phrases such as '*all the time*' while describing the inter-personal problems arising due to all the reasons mentioned, which leads to the interpretation that teamwork during DfSI project was negatively affected due to multi-disciplinary nature of the team during 'naming', 'framing' and 'moving' activities at the least. There is no evidence for reflective activity in the data pertaining to multi-disciplinary nature of the team B.

1.1.3 Analysis of team C

Step 3: Making Observation for Subsection 1/C

Participant 4 presents two separate points, one supporting effective teamwork during DfSI project by her team and one refuting the effective teamwork during DfSI project by her team. Therefore the quote is broken into two parts. Quote 4.1.2 supports effective team work by team C and is shown below. On the other hand, quote 4.1.1 is discussed later after all arguments supporting effective team work by team C are exhausted. This is finer granulation of data to effectively draw out details around the argument being made by the participant.
Participant 4 mentioned that,

> "*Having a business student was good for the end bit, 'cause she was getting stuff organised, so if it was all designers I don't think anything would have happened in the end. It would have all been very last minute, but I think another couple of designers would have helped I think, just to get ideas rolling a bit quicker*"[Q4.1.2]

Step 3.1: Thematic analysis to recognise arguments made

The quote explains the positive effect of multi-disciplinary nature of the team with regard to sharing responsibilities during different phases of the DfSI project. The comparison with design discipline leads to can be said to show that multiple disciplines balanced the project responsibilities. Therefore, the first argument can be said to be:

Argument 1/C-4.1.2: *Different disciplines helped during different stages of the project*

Based on Valkenburg and Dorst's (1998) explanation, the participant can be said to explain the 'moving' activities when she mentions "*the end bit*" but can be said to explain 'framing' activities of the team based on the phrase "*getting stuff organised*". The participant definitely talks about 'moving' activities when explaining the need for more designers within the team. Thus, in the argument the participant can be said to explain 'framing' and 'moving' activities.

Step 3.2: Applying model of inner values

The participant can be said to show Hopefulness for co-operation while mentioning "*another couple of designers would have helped I think, just to get ideas rolling a bit quicker*" The participant further can be said to show Acceptance of other's view in the phrase "*Having a business student was good for the end bit ... she was getting stuff organised*". The participant is describing in a very succinct manner how the multi-disciplinarity aspect of the project

affected the teamwork during DfSI project as applied by team B. The participant further mentions a quote refuting effectiveness of teamwork during DfSI project which is mentioned in the next section. Thus the finding for participant 4 can be said to be {+H+A}, visualised as:

The quote by participant 7 also provides two opposing arguments, one that supports effective team work during DfSI project and another that refutes it. Thus, the quote is broken into finer sub-quotes.

> "*When you come here (MDI), you start to think of things from other points of view, and if you think you've got an answer or solution and someone else can add to it from their perspective and then again someone can add, so you kind of build up into a stronger concept, or a stronger idea. But it's a lot better... I think in a way when you're all business, if you ... you disagree on one part of it, 'cause like everyone's kind of involved in every aspect, so you're trying to get everyone to agree, so it's a bit harder. Where Name and Name had a bit of friction, because they're both graphic designers, they both want to do the same thing and they both want to do the same part of the project, so they both think that what they're going to do is the best thing, so ... I felt I was, we were ... what's it called? Basically just balance each other out. So I work well with them, I think, 'cause we were different and we brought different things to the project. Where on this course, it's a bit easier, 'cause I was saying for my portfolio, as well, I've been writing in about the team dynamics, and I was saying I work well with Name and Name, and I think that's 'cause we kind of balance each other out*."[Q7.1.1]

Step 3.1: Thematic analysis to recognise arguments made

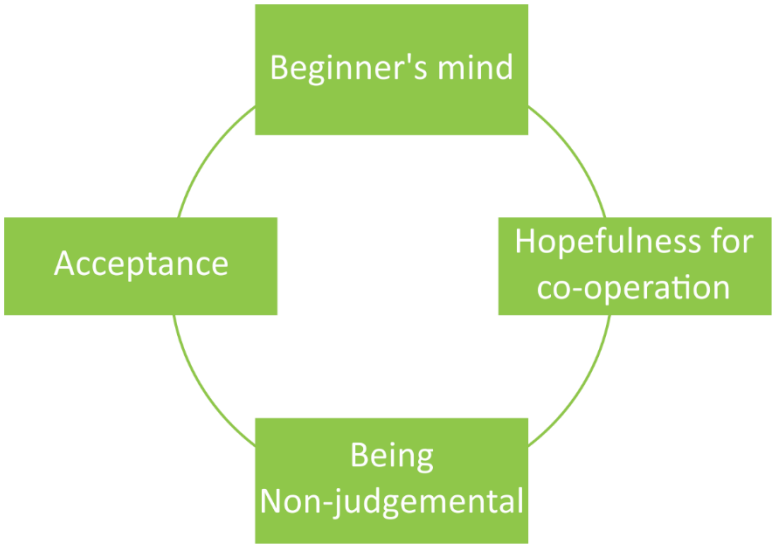
The participant mentions the phrase "*balance each other out*" which again suggests that the members from different disciplines could share responsibility of different aspects of the project thus creating a balance during DfSI project. Thus, the argument made can be:

<u>Argument 1/C-7.1.1</u>: *different disciplines balance each other during different stages of the project*

The use of the phrase "*stronger concept, or a stronger idea*" suggests that the participant may be referring to the 'moving' activities during team work as defined by Valkenburg and Dorst (1998). However, the participant also mentions "*we were different and we brought different things to the project*" Thus, the participant talks about DfSI project in general when mentioning the argument but specifically about 'moving' activities.

Step 3.2: Applying model of inner values

The participant can be said to show Beginner's mind when she mentions "*think of things from other points of view".* She mentions this was the thing their team did which led to for solutions and ideas to grow by "*someone else can add to it from their perspective*" which can be said to show that the team had the inner value of Hopefulness for co-operation. The participant mentions "*We balance each other out".* She does not mention good or bad, fair or unfair which can be said to show the team had the inner value of Non-judgemental where the members balanced each other. The participant's views of the actions by the team show Acceptance when she mentions "*we were different and we brought different things to the project".* Thus, the inner values observed in the quote can be said to be {+B+H+N+A }, visualised as:



The participant further mentions,

"*I think it depends what stage you're on in the project, 'cause people are good, or their strengths come into play at different stages of the project, but for me I think it's near the end, kind of like project manager type thing, pulling everything together and getting everyone on track. Where at the beginning, like the ideation bit, I can't like come up with an idea, like with other people it's just shouting out these ideas. If someone says something, I can think about whether it's good or bad; I can add to it and change it, but I find it hard to just think of something out of thin air, so I'm better later on when things start going ... A bit like, different people are better at different stages, so some people would be more prominent or take a bigger role at different stages."*[Q7.3]

Step 3.1: Thematic analysis to recognise arguments made

The participant clearly explains "*their strengths come into play at different stages of the project*" Thus the argument can again be said to be that

Argument 1/C-7.3: *different disciplines had different strengths which came into play different stages of the project*

The participant describes the ideation and the "*pulling together*" which pertain to the 'moving' activities while the phrase "project management…*getting everyone on track*" can be said to be associated to 'framing' activity based on Valkenburg and Dorst's (1998) explanation. The participant also mentions 'reflecting' activity for evaluating ideas that have been generated. Thus, the participant primarily refers to 'moving' activity and may also have referred to 'framing' activity while making the argument.

Step 3.2: Applying model of inner values

The participant mentions "*strengths come into play at different stages of the project*" which can be said to show Hopefulness for co-operation. The participant mentions "*different people are better at different stages*" which can be said to show that the participant and the team had the inner value of Acceptance. Thus, the inner values observed in the quote can be said to be {+H+A }, visualised as:

Participant 4 mentions,

> "*I think there would have been more input during brainstorming sessions, because during the project, people weren't coming forward with ideas, they were happy just to continue on, 'cause it was the project we're flowing on from, just taking those ideas and no-one was really coming up with new ideas, no-one, no-one , so I think if we had more designers, we would be pushing each other to come up with more ideas, rather than just using the same ones*" [4.1.1]

Step 3.1: Thematic analysis to recognise arguments made

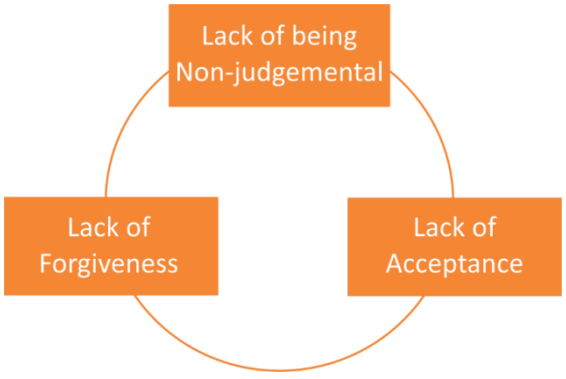
The quote provides explanation that members in team did not contribute during ideation phase and that more designers were needed to make the ideation phase more fruitful. Thus, the argument that can be said to arise from the quote is:

Argument 1/C-4.1.1: *More designers were required for a better ideation phase because members of other disciplines could not contribute to new ideas.*

The participant clearly refers to ideation which can be categorised as 'moving' activity as defined by Valkenburg and Dorst's (1998) explanation.

Step 3.2: Applying model of inner values

The participant mentions that during ideation phase "*people weren't coming forward with ideas, they were happy just to continue on*". This can be said to show the lack of the inner value of being Non-judgemental. The participant mentions this is a wishful thinking way saying "*if we had more designers, we would be pushing each other*". This can be said to show the lack of the inner value of Acceptance. The participant repeats the phrase "*no-one*" to describe the process of ideation. The repetition can be said to show the lack of Forgiveness by the participant. Thus, the inner values observed in the quote can be said to be {-N-A-F}, visualised as:



Participant 7 mentions,

> "*I think in a way when you're all business, if you ... say you've got a presentation to do or something, and you disagree on one part of it, 'cause like everyone's kind of involved in every aspect, so you're trying to get everyone to agree, so it's a bit harder... Where Name and Name had a bit of friction, because they're both graphic designers, they both want to do the same thing and they both want to do the same part of the project, so they both think that what they're going to do is the best thing, so ... I felt I was, we were ... what's it called? Basically just balance each other out. So I work well with them, I think, 'cause we were different and we brought different things to the project.*"[Q7.1.2]

Step 3.1: Thematic analysis to recognise arguments made

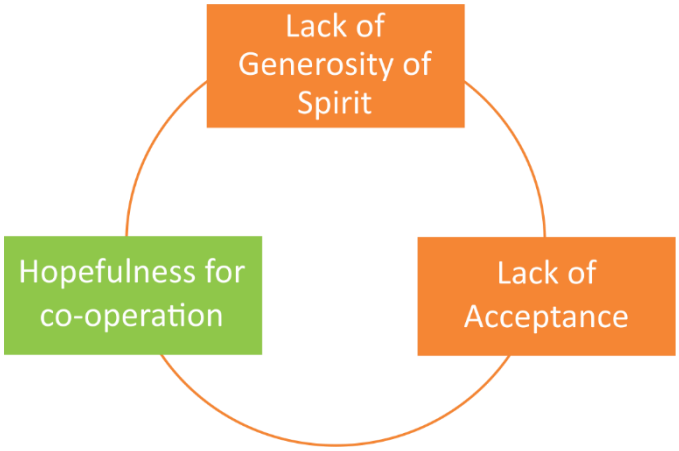
This quote is a part of quote 7.1.2 and this section analyses the phrase "*bit of friction, because they're both graphic designers*" The quote refers to the friction between designers and can be said to provide the argument:

Argument 1/C-7.1.2 *Friction between the team members was due to similarity in strengths*.

The participant talks about tasks where designers shared skills. This is primarily the ideation of solutions which can be categorised as 'moving' activity and the participant also mentions discussion which reveal 'reflecting' activity in the explanation provided by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant mentions how the members of same disciplines clashed because "*they both want to do the same part of the project*". Here the participant can be said to show that the team lacked the inner value of Generosity of spirit between members of same discipline. She mentions "*they both think that what they're going to do is the best thing*" which can be said to show that the team members from same discipline lacked inner value of Acceptance. The use of the phrase "*balance each other out.*." can be said to show the Hopefulness for co-operation within the team. Thus, the inner values observed in the quote can be said to be {-G-A+H}, visualised as:



Participant 9 mentions,

> "*Because I didn't get along very well with the designer ... a lot, not really. That wasn't a good excuse! I quite like how the business person would be able to manage the whole dynamic of the team, and it's just good to have other opinions... The combination was fine, but it's just different personality really. I got along well with Name, but then Name was a bit daunting 'cause she talks really fast, and then it feels like I can't give my opinion 'cause before I can actually give my opinion, she's already got another opinion and just the fact that she's going to learn graphic design, it feels like she got me as ... like a competition, but I don't need that. I don't need the competition because I know I am a graphic designer. I've got a degree in it. I don't have to prove to myself that I am a graphic designer. Yeah, that's a bit of a challenge, 'cause she would just do something similar in just different way, just to make her way.*"[Q9.1]

Step 3.1: Thematic analysis to recognise arguments made

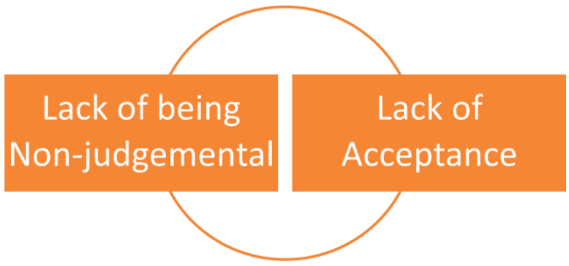
The participant mentions role of members of other disciplines being important in different phases of DfSI project and mentions "*it's just good to have other opinions*". But she does not specify when other disciplines were useful and does not provide sufficient details to say that the participant has made an argument for effective team work due to multi-disciplinary nature of the team during the DfSI project. However, the quote portrays the conflict because of the difference in personalities between members of same discipline. Thus, the argument presented can be said to be:

Argument 1/C-9.1 *Friction between the team members was due to similarity in strengths and difference in personalities*.

The participant mentions design based activities and explains other designer "*would just do something similar in just different way*". This is clearly not 'naming' activity, and it is fairly uncertain that participant is talking about 'framing' activity as well as 'reflecting' activity during the DfSI project. What can be deduced with certainty is that the participant talks about 'moving' and 'reflecting' activities as defined by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant uses the phrase "*I don't need the competition... I don't have to prove to myself*" which can be said to show the lack of inner value of being Non-judgemental. The participant mentions that the other designer in the team "*would just do something similar in just different way, just to make her way*". This can be said to show that lack of inner value of Acceptance of other's views in team B. Thus, the inner values observed in the quote can be said to be {-N-A}, visualised as:



Step 4: Finding meaning in language for Subsection 1/C

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

The data indicates that members from different disciplines helped each other and balanced each other's strengths and weaknesses during different stages of the DfSI project (See Argument 1/C-4.1.2: *Different disciplines helped during different stages of the project* and also see Argument 1/C-7.1.1: *different disciplines balance each other during different stages of the project*) . Such balance was primarily during moving activities but also during framing activities to a certain extent. Similarly, the strengths of different disciplines were valuable to different stages of the DfSI project (See Argument 1/C-7.3: *different disciplines had different strengths which came into play different stages of the project*). These arguments indicate meta-argument pertaining to effect of multi-disciplinary nature of team on teamwork during DfSI project, which is: '*different disciplines balance each other strengths and weaknesses during different stages of the project*'.

The arguments refuting effective team work due to multi-disciplinary team reveal that the team required more designers during 'moving' activities along with other disciplinary members so that more ideas could be generated (See Argument 1/C-4.1.1: *More designers were required for a better ideation phase because members of other disciplines could not contribute to new ideas*). There are no other arguments which fall in line with the argument made by the participant so it is carried as meta-argument.

While most frictions within the team were due to similarity of discipline, especially between designers during 'moving' activities, having members of other discipline was helpful to overcome such hurdle (See Argument 1/C-7.1.2 *Friction between the team members was due to similarity in strengths*). The friction was due to difference in personality in addition to similarity in strengths (See Argument 1/C-9.1 *Friction between the team members was due to similarity in strengths and difference in personalities*). Thus, the meta-argument that can be derived is '*Friction between the team members was due to similarity in strengths and difference in personalities but other disciplinary members helped to resolve the friction'.*

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: Different disciplines balanced each other's strengths and weaknesses during different stages of the project.

Evidentiary quote: Q4.1.2, Q7.1.1, Q 7.3

Brief summary of findings from thematic analysis: Members of different disciplines not only contributed to different stages of the project, they also helped to build each other's strengths and mediate arising problems within team.

Inner value observed in the data:

Inner values: Beginner's mind (Q7.1.1), Hopefulness for co-operation (Q4.1.2, Q7.1.1), the inner value of being Non-judgemental (Q7.1.1) and inner value of Acceptance (Q4.1.2, Q7.1.1, Q 7.3)

Evidence: The thematic analysis revealed that the team members from different discipline had different strengths that they contributed to different stages of the DfSI project. The observation of Hopefulness for co-operation can therefore be said to be evident in 'framing' and 'moving' activities which the arguments address (Q4.1.2, Q7.1.1). The members were not only contributing to the project, they were contributing to each other's strengths which can be said to show that the team had inner value of

Beginner's mind especially during the 'moving' activities of the DfSI project (Q7.1.1). The use of the phrase 'balance each other' during 'moving' activities led to the recognition of the inner value of team being Non-judgemental (Q7.1.1). Such actions during 'moving' activities of the project have also been mention by other participant who explains that team members helped each other out. Thus it may be said that the team had the inner value of being Non-judgemental towards each other. The team members mention on different stages of the DfSI project, the team accepted their disciplinary differences and used their strengths and weaknesses to help each other (Q4.1.2, Q7.1.1, Q 7.3) which can be said to show the team had the inner value of Acceptance. *Findings*: Beginner's mind (Q7.1.1), Hopefulness for co-operation (Q4.1.2, Q7.1.1) and Acceptance (Q4.1.2, Q7.1.1, Q 7.3) are strong observations and the inner value of being Non-judgemental (Q7.1.1) is a weak observation as the inner values of the team.

Meta-Argument 2: *More designers were required for a better ideation phase because members of other disciplines could not contribute to new ideas.*

Evidentiary quote: Q 4.1.1

Inner values: Hopefulness for co-operation (Q4.1.1) lack of Acceptance (Q4.1.1) and lack of Forgiveness (Q4.1.1).

Evidence: This argument is considered conjecture as it provided expectations about the project and not information during the teamwork during DfSI project of the team.

Findings: The inner values are not valid observations because the argument is based on conjecture and not on facts about the project.

Meta-Argument 3: *Friction between the team members was due to similarity in strengths and difference in personalities but other disciplinary members helped to resolve the friction.*

Evidentiary quote: Q7.1.2, Q9.1

Brief summary of findings from thematic analysis: The friction in the team members was due to creative differences, need to apply skill on same tasks and difference in personality which members from other discipline could help to resolve.

Inner value observed in the data: lack of Generosity of spirit (Q7.1.2) and Hopefulness for co-operation (Q7.1.2), lack of the inner value of being Non-judgemental (Q9.1), lack of Acceptance (Q7.1.2, Q9.1)

Evidence: The members from same discipline wanted to work on same task but could not agree on approach to the task. This suggests that members of the team experienced friction during 'moving' activities because either of the designers in the team could not accept each other's contribution to the same task. This can be said to show lack of acceptance of situation which is observed by applying the model of inner values (Q7.1.2, Q9.1). Both the designers could not let go their aspiration to contribute and could not compromise working together which would suggest that the team members also lacked the inner value of Generosity of spirit, which was observed by applying the proposed model of inner value (Q7.1.2). One of the team members explained this as difference in personality and the need to prove skill, which suggests the member may be showing judgemental behaviour (Q9.1). However, such reaction may or may not have existed during team work on the DfSI project. Also, there is no other indication to suggest the members of the team showed judgemental attitude towards each other during team work on the DfSI project. However, the other members of the team helped to reduce friction which led to designers working together during later stages of the project which suggests that the team may have had the inner value of Hopefulness for co-operation (Q7.1.2).

Findings: Lack of Generosity of spirit (Q7.1.2) and Hopefulness for co-operation (Q7.1.2) were strong observations and lack of the inner value of being Non-judgemental (Q9.1) and lack of Acceptance (Q9.1) were weak observations as inner values for the team.

Summarization of Findings and observation for subsection 1/C

Thematic analysis

Two meta arguments can be said to be derived from data provided by members of team C on their teamwork during DfSI projects.

Meta-Argument 1: Different disciplines balanced each other's strengths and weaknesses during different stages of the project.

Multi-disciplinary nature of the team was beneficial to team work during DfSI project by team C because members had skills which were useful at different stages of the project such as moving and framing activities (See Argument 1/C-4.1.2: *Different disciplines helped during different stages of the project* and Argument 1/C-7.3: *different disciplines had different strengths which came into play different stages of the project*). The members not only helped the project but also balanced each other's strengths and weaknesses for team work during moving and framing activities of the DfSI project. The members from other disciplines not only contributed to the design activities, but they also helped resolve and mediate friction within members of same discipline. (see Argument 1/C-7.1.1: *different disciplines balance each other during different stages of the project*).

Meta-Argument 2 was a viewpoint of one participant and was based on hypothetical situation and therefore has not been carried forward for analysis.

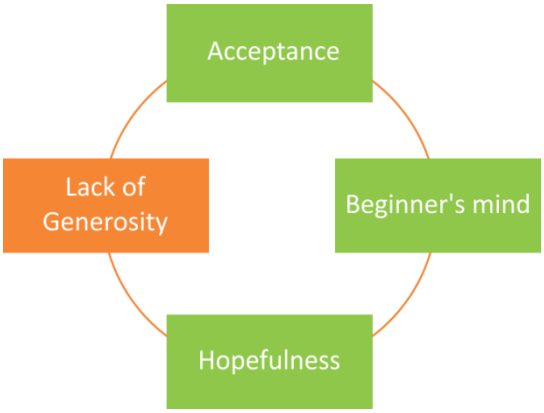
Meta-Argument 3: *Friction between the team members was due to similarity in strengths and difference in personalities but other disciplinary members helped to resolve the friction.*

There was friction because members of same discipline wanted to contribute to same tasks differently, especially between designers during 'moving' activities of the DfSI project. But the team overcame such interpersonal and creative differences between members of same discipline because of interjection and mediation by members of other discipline (See Argument 1/C-7.1.2 *Friction between the team members was due to similarity in strengths*). Such friction may have occurred due to difference in personality in addition to similarity in strengths (See Argument 1/C-9.1 *Friction between the team members was due to similarity in strengths and difference in personalities*).

Inner values

The team accepted input from members from other discipline during moving phase. However, during some moving activities members of same discipline did not accept each other's input (Q4.1.2, Q7.1.1, Q 7.3). However, this situation was resolved through mediation by the team (Q7.1.2, Q9.1) and therefore the team can be said to have the inner value of acceptance. The team also showed beginner's mind when dealing with multiple disciplines within the team (Q7.1.1). Some individual members may have seemed judgemental (Q9.1) during the post project interviews, but the team showed the inner value of being Non-judgemental (Q7.1.1) towards each other during team work for DfSI project. However, when there was friction between the two designers, they can be said to have shown lack of the inner value of generosity towards each other. But every participant mention that members of the team remained co-operative throughout the project even during times of friction (Q4.1.2, Q7.1.1 and Q7.1.2). Thus, Hopefulness for co-operation, Acceptance, Beginner's mind and lack of generosity can be said to be the inner values of the team with regard to the multi-disciplinary nature of their team, visualised as:

Figure 9: Inner values of team C towards Multidisciplinary teamwork during the DfSI project



Reflection

The members of team C reflected primarily on the advantages of the multi-disciplinary nature of team. They reflected mostly on 'moving' activities and some 'framing' activities of the DfSI project. The members from different disciplines were helpful in various ways as explained by the data- different strengths, applicable at different stages of project and aiding strengths of members of team. The team seems to believe that having same skill set led to some friction between the two designers but having members from other disciplines may have brought a different perspective which helped resolve inter-personal problems and

creative differences. Such reflections can be interpreted to bring a third person ontology to the team work during DfSI project due to multi-disciplinary nature of the team.

1.2 Analysis of theme 2: The effect of individual's knowledge on team work during DfSI project

Step 2: Creating Data matrix to organise data:

Participant no.	Quotes that support effective teamwork during DfSI project		Quotes that refute effective teamwork during DfSI project	
Sub-section 2/A: Team A	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	3.1 3.18	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.2.1.	1.7 1.8 5.4 12.1	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.2.1.
Sub-section 2/B: Team B			Quote Number	Where to locate in the thesis
			2.22 6.16 6.17 11.27	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.2.2.
Sub-section 2/C: Team C	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	4.29 7.3	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.2.3.	4.28 7.12	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.2.3.

1.2.1 Analysis of team A

Step 3: Making Observation for Subsection 2/A

Participant 3 mentions that

> "*The thing is that the strength here is that all the difference disciplines are coming together and they contribute in the way that we won't be able to contribute. So it's like exchange of the skills and they would be responsible for things that we won't, you know, be able to help much. So, it all depends on what kind of project - if all those skills are really necessary to work on this project.*" [Q3.1]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains that skills from other discipline became strength for the team work during DfSI project. Thus the argument made can be

Argument 2/A-3.1 *Strengths of different disciplines come together and skills were exchanged*

The participant talks about different responsibilities and could be talking about 'naming', framing', 'moving' and 'reflecting' activities as defined by the explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The phrase "*responsible for* (different) *things*." indicates the inner value of Hopefulness for co-operation in team A. The participant does not mention this exchange in terms of good or bad practice, or fair or unfair trade. Instead, the participant mentions it's the need of the project which defines the constitution of the team. Thus, the participant can be said to show the inner value of being Non-Judgemental while explaining the phrases that show inner value of Hopefulness for co-operation. Thus, the inner values observed in the quote can be said to be {+H+N}, visualised as:

Participant 3 mentions that,

"*I was a bit worried because I'm quite slow on the computer and I apparently said that I can do visuals and Photoshop things and I know it takes me a long time but it was fine because like, because our work was so organised that I knew that I have to finish it, you know, like as quick as possible, then start something new. So I mean I don't think I caused any delays or something in the project because of my slow working. But I pleased that much with me that I knew if I've got something to do I just stayed at night, you know, to finish it to make it ready for next day. Because I think I was more motivated, you know, to you finish my tasks and you know, not cause any delays.*"[Q3.18]

Step 3.1: Thematic analysis to recognise arguments made

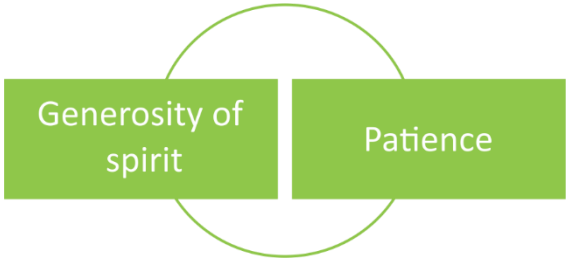
The participant can be said to show concern and awareness of own weakness and responsibilities. The argument this participant can be said to make is that

Argument 2/A-3.18 Awareness of the extent of own knowledge and responsibility towards team was source of motivation

The participant talks about 'moving' activities but it cannot be definitively said if the participant is mentioning 'naming', 'framing' or 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mentions feeling responsible not to cause any delays to the team. Thus, the participant can be said to show the inner value of Generosity of spirit. The participant mentions "*I just stayed at night*" which can be said to show the inner value of Patience. The participant does not think about good or bad or fair or unfair. She just mentions the events as they are. However, she can be said to show Judgemental of self. This is an interesting observation as it does not fit into the current definition of the inner values but being Non-judgmental of self has been mentioned in the AbMT literature as an important inner value. Thus, the observation of participant showing the inner value of Non-judgemental being is suspended. Thus, the inner values observed in the quote can be said to be {+G+P}, visualised as:



Participant 1 mentions,

"*I don't think that some of the people were not the strongest from their discipline. Which I think sometimes made it quite difficult. Not only for us making sure that everyone was working effectively but for themselves, because they didn't really know what to do. Whereas if I was getting on with the business side of things and another person was getting on with the design side of things it was quite difficult to think for them, "Right well what can he do?" So that was quite difficult.*"[Q1.7]

Step 3.1: Thematic analysis to recognise arguments made

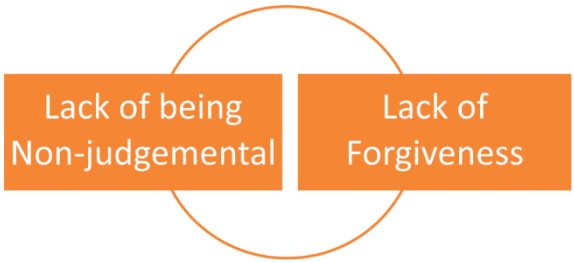
The participant explains how lack of understanding led to added workload for other members of the team. The participant explains that lack of knowledge, or lack of skills and enthusiasm for applying knowledge led to members not knowing roles and tasks and others having to make those decisions for them. Thus, the argument made by the participant can be said to be:

Argument 2/A-1.7 *Applying skill is difficult without knowledge about one's role within the project and the team*

The participant talks about tasks which can be said to be the 'framing' activities or 'moving' activities or both. Such activities are based on the explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant makes generalizations that "*some of the people were not the strongest..."* which can be said to show that the participant lacks the inner value of Non-judgemental being. The participant also repeats the phrase "*quite difficult"* which can be said to show lack of the inner value of Forgiveness. Thus, the inner values observed in the quote can be said to be {-N-F}, visualised as:



The participant continues,

"*I think a lot of people are here just for the sake of doing a Masters. I don't think that they necessarily have the skills and desire to get a decent grade. And I think that really affects the level of input put into a project. I think that you need to understand your discipline to a point where if someone asks you a question about it, you can answer it within, well either straightway or within doing a short amount of research. You*

shouldn't have to go away for weeks on end and then come back with minimal effort. I think that understanding your discipline is really, really important for Design work definitely" [Q1.8]

Step 3.1: Thematic analysis to recognise arguments made

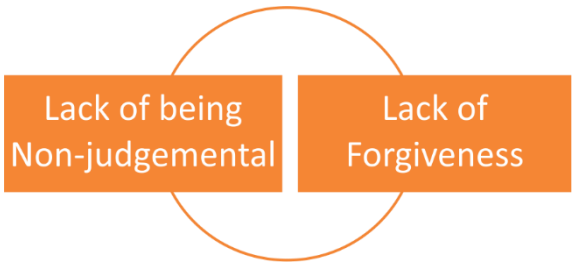
The participant explains level of effort and skill as important for enthusiasm during project. The participant also explains need to apply skill and knowledge if not right away, at least after a small amount of research so as to contribute to the team work during DfSI project. Thus, the argument made by the participant can be said to be:

Argument 2/A-1.7 Lack of knowledge or skill affected team member's input into the project

The participant does not provide specific details of any incidences so it is difficult to determine which design activities is the participant talking about.

Step 3.2: Applying model of inner values

The participant makes generalization about "*a lot of people...*" which can be said to show the participant lacked the inner value of Non- judgemental being. The participant repeats the phrase "*really important*" in the above quote. This can be said to show lack of the inner value of Forgiveness as he can be said to show his feelings through the repetition. Thus, the inner values observed in the quote can be said to be {-N-F}, visualised as:



Participant 5 reflects that,

"*but there's one person in our group who always asks for things to do, and he doesn't really know what his role is in the team and I think that's the hardest bit, because sometimes when you see a problem, you already know what to do with it, and from your, whatever major you're at, you kind of know, "Okay, I'll do this website. Okay, I'll do the business side of it, or I'll do the visualising part of it", and although that person, when we've given him a task which is related to his course, and he's really good at it, he did it in one day, but when, but most of the time he would ask each individual what to do, and what to do next, and sometimes you just want to say, like, "You know, you've got to think what else is needed?" So, other than that, I think for a*

group to work well together you've got to know your role. It doesn't matter how many people there is. There could be three people but it can work really good if they know what they're doing, but I think it kind of slows you down if someone keeps asking you, like, "What should I do next?" and then they keep coming back, "What should I do now? Can you give this to me?" Well, and they are just sitting down there, and then it's like, you know, I could have done it."[Q5.4]

Step 3.1: Thematic analysis to recognise arguments made

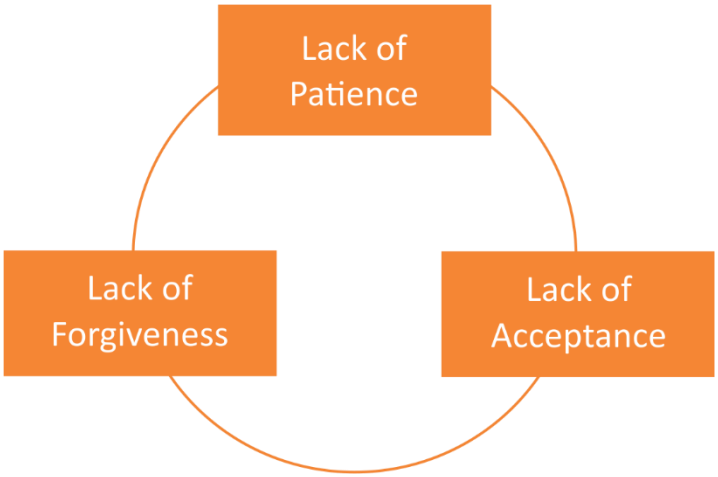
The participant talks about one's understanding on applying own skills during project is important and when one of the team members did not know how or what to contribute, the other team members had to assign tasks which was a distraction from their own work. Thus, the argument that the participant is making can be said to be:

Argument 2/A-1.7 *Lack of understanding of what to contribute required other team members to assign tasks and caused distraction to them*.

The participant is clearly talking about 'framing' and 'moving' activities. The appropriate 'frame' to look at project helps determine the 'moving' activity as described by Valkenburg and Dorst (1998). The participant clearly explains lack of correct 'frames' affected 'moving' activities of the member but also other members of the team.

Step 3.2: Applying model of inner values

The participant mentions her frustration during the project in the phrase "*you've got to think what else is needed"* which can be said to show lack of the inner value of Patience. This lack of Patience bring the feeling of difficulty which the participant can be said to show in the phrase "...*the hardest bit*" which can be said to show the lack of Acceptance of other's views. The participant then assigns blames by using the phrase "...*slows you down*" and repeating which can be said to show lack of the inner value Forgiveness. Thus, the inner values observed in the quote can be said to be {-P-A-F}, visualised as:



Step 4: Finding meaning in language for Subsection 2/A

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

The data can be said to show that knowledge from different members of the team was contributed to build each other's skill set and enhanced input into the DfSI project (See Argument 2/A-3.1 *Strengths of different disciplines come together and skills were exchanged*). The participant talks about different responsibilities throughout the project which different design activities as defined by Valkenburg and Dorst (1998). As there are no other arguments to join with this argument, the Meta-Argument is said to be *Strengths of different disciplines come together and skills were exchanged.*

The data also can be said to show that participants were aware of their strengths, weaknesses and responsibilities. The 'framing' activities which enabled such knowledge was source of motivation for further 'moving' activities (See Argument 2/A-3.18 *Awareness of own knowledge and responsibility was source of motivation*) As there is only one evidentiary quote providing the argument, the argument is carried as meta argument as is. Thus, the meta-argument can be said to be *Awareness of own knowledge and responsibility was source of motivation.*

The data can be said to show that one of the members of team A lacked knowledge, skill or understanding of how or what to contribute during the DfSI project. This affected team work because other members of the team had to assign tasks to this member and this distracted them during DfSI project (See Argument 2/A-1.7 *Lack of understanding of what to contribute required other team members to assign tasks and caused distraction to them*). The

participants believe that knowledge and understanding of project is key to be able to contribute any skill set(See Argument 2/A-1.7 *Applying skill is difficult without knowledge about one's role within the project and the team*). The participants also believe that lack of knowledge or skill in itself may be the reason for low contribution (See Argument 2/A-1.7 *Lack of knowledge or skill affected team member's input into the project*). Thus the meta-argument which can be said to be arising from data is *Lack of knowledge, skills or enthusiasm for new knowledge led to the one of the members not knowing their tasks and distracted other members of the team.*

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: *Strengths of different disciplines come together and skills were exchanged*

Evidentiary quote: Q3.1

Brief summary of findings from thematic analysis: The knowledge from different disciplines was applied by members from different disciplines and this enhanced the input into the DfSI project and aided team work because sharing of knowledge enhanced input from every member of the team.

Inner value observed in the data: Hopefulness for co-operation (Q3.1), being Non-judgmental (Q3.1)

Evidence: The members of team A shared knowledge with each other which enhanced their individual and team contribution to the DfSI project. This can be said to show inner value of hopefulness for co-operation within the team. The observation from applying proposed model of inner values is therefore, considered to be valid observation. Similarly, the observation from applying the proposed model of inner values can be said to show that the team had inner value of being Non-judgemental. The team had hopefulness for the betterment of the project and therefore they put need of project above their own desires. Though this may be termed generosity of spirit, it would be erroneous to term this as being Non-judgemental.

Findings: Team A had the inner value of Hopefulness for co-operation

Meta-Argument 2: *Awareness of the extent of own knowledge and responsibility towards team was source of motivation*

Evidentiary quote: Q3.18

Brief summary of findings from thematic analysis: The team members knew their strength, their weaknesses and their responsibilities. To ensure that team work was not affected, team members utilised this knowledge while contributing to the project.

Inner value observed in the data: Generosity of spirit (3.18) and Patience (3.18)

Evidence: The team members put the team's requirements above their own needs and this can be said to show that team had the inner value of Generosity of spirit. Thus, the observation made by applying model of inner values is considered to be appropriate. This pertains to 'framing' activities enhancing 'moving' activities and required team members to put efforts to overcome their own shortcomings. The perseverance of team members can be said to show that they had the inner value of Patience. Thus, Patience can be said to have been correctly observed by applying proposed model of inner values.

Findings: Generosity of spirit (3.18) and Patience (3.18) are considered weak observation as inner values for the team.

Meta-Argument 3: *Lack of knowledge, skills or enthusiasm for new knowledge led to the one of the members not knowing their tasks and distracted other members of the team.*

Evidentiary quote: Q 1.7, Q1.8 and Q5.4

Brief summary of findings from thematic analysis: The data can be said to show that one of the team members either lacked knowledge or understanding to apply knowledge during the DfSI project. The team work was affected by this because other members of the team had to make decision regarding his contribution for him.

Inner value observed in the data: lack of being Non-judgemental (Q1.7, Q1.8), lack of Patience (5.4), lack of Acceptance (Q5.4), and lack of Forgiveness (Q1.7, Q1.8, Q 5.4)

Evidence: The members of the team mention one of the team members lacking knowledge or skill or understanding. The observation from applying proposed model of inner values that the members were judgemental is therefore considered to be incorrect as it may be an observation on their part (Q1.7, Q1.8). The members of the team helped this member by making decisions for him and guiding the way he could contribute to the project. This can be said to show that the observation of lack of patience (Q5.4) and lack of forgiveness (Q1.7, Q1.8, Q 5.4) made by applying model of inner value cannot be supported as inner value of the team and may be either observation on a participant during post-project interview. The data can be said to show that many members of the team mention that they could not accept this behaviour as it distracted them from their

own tasks which confirms the observation of lack of acceptance as inner value of the team (Q5.4).

Findings: The inner value of lack of Acceptance (Q5.4) is inner values of the team but lack of being Non-judgemental (Q1.7, Q1.8), lack of Patience (5.4) and lack of forgiveness are not valid observations as the inner values for the team.

Summarization of Findings and observation for subsection 2/A

Thematic analysis

Meta-Argument 1: *Strengths of different disciplines come together and skills were exchanged*
The data can be said to show that knowledge from members of different disciplines helped the team to build each other's skill set and enhance each other's input during DfSI project (See Argument 2/A-3.1. Such knowledge therefore can be said to have improved the team work because the strengths of one discipline covered the weakness of other during different stages of the project.

Meta-Argument 2: *Awareness of the extent of own knowledge and responsibility towards team was source of motivation*
Participants were aware of their strengths, weaknesses and responsibilities due to 'framing' activities at the beginning of the project. Such knowledge was source of motivation for 'moving' activities that followed during DfSI project where the members worked harder, smarter and to a deadline, for the betterment of the team and the project (See Argument 2/A-3.18).

Meta-Argument 3: *Lack of knowledge, skills or enthusiasm for new knowledge led to the one of the members not knowing their tasks and distracted other members of the team.*
The data can be said to show that one of the members of team A either lacked knowledge, skill or understanding of how or what to contribute during the DfSI project. This affected team work because other members of the team had to assign tasks to this member and this distracted them during DfSI project (See Argument 2/A-1.7 *Lack of understanding of what to contribute required other team members to assign tasks and caused distraction to them*). The participants believe that knowledge and understanding of project is key to be able to contribute any skill set (See Argument 2/A-1.7 *Applying skill is difficult without knowledge about one's role within the project and the team*). The participants also believe that lack of knowledge or skill in itself may be the reason for low contribution (See Argument 2/A-1.7 *Lack of knowledge or skill affected team member's input into the project*).

Inner values

The members of team A shared knowledge with each other which enhanced their individual and team contribution to the DfSI project. This can be said to show inner value of hopefulness for co-operation within the team (Q3.1). The team members put the team's requirements above their own needs and this can be said to show that team had the inner value of Generosity of spirit (Q3.18).This pertains to 'framing' activities enhancing 'moving' activities and required team members to put efforts to overcome their own shortcomings. Such perseverance of team members can be said to show that they had the inner value of Patience (Q3.18). The members of the team mention one of the team members lacking knowledge or skill or understanding. The data can be said to show that many members of the team mention that they could not accept this behaviour as it distracted them from their own tasks which can be said to depict lack of the inner value of Acceptance (Q5.4). Thus, the inner values of team A with regard to strength and ability to apply knowledge while applying team work during DfSI project can be said to be: [+H+G+P-A]

Figure 10: Inner values of team A towards sharing and building strength of knowledge for effective teamwork during DfSI project

Reflection

The participants explain strength and ability to apply knowledge was essential to the team work during DfSI project. When the team members could apply their disciplinary knowledge they enhanced each other's contributions to the project. On the other hand, lack of ability to apply knowledge was perceived as hindrance. The strength and ability to apply disciplinary

knowledge was enhanced due to ‘framing’ activities which in-turn provided motivation and structure to the ‘moving’ activities that followed. However, the members of the team primarily focused on ‘moving’ activities when reflecting on the strength and ability to apply knowledge while applying teamwork during the DfSI project.

1.2.2 Analysis of team B

Step 3: Making Observation for Subsection 2/B
Participant 2 mentioned that,

> "*The thing is like different people had their own, I mean the staff, they all had different takes on the project, and I felt like – the thing is, again it ties in with the team members as well. I found that they (the team) listened more to external (teachers) input than their team input, so, especially me. So if someone else, say if Name had commented, "Oh yeah, so why are you guys doing…" like questions I'd ask when they come with designs or ideas I'd say, "Oh yeah, do you think that makes sense, or how do you think this will work, or how do you think it'll pan out? Do you think it'll be a long term thing?" not that I was criticising their ideas or anything; I was just saying things that anyone would ask you. I mean just common sense, would it work, why this age group, or why this whatever, like things that we need to talk about just to meet the brief. But they did not include these, never did and then ideas were weak*" [Q2.22]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains that similar questions and opinions from external sources were considered by the team during team work for DfSI project, but opinions were ignored if given by fellow member of the team. This affected team work and led to weak ideas as outcomes of the DfSI project. Thus, the argument arising from the quote can be said to be:

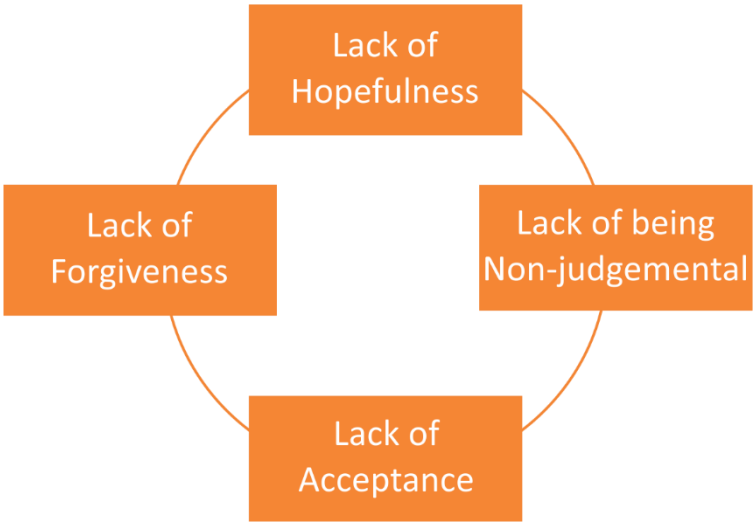
Argument 2/B-2.22 *the team discounted opinions and suggestions of fellow members which led to poorly thought out ideas and concepts*.

The participant can be said to be addressing different design activities, such as the ideation tasks refer to the 'moving' activities, sense making refers to 'framing' activity, understanding the "*takes on the project*" refers to 'naming' activity. The participant also mentions revisiting decisions to verify actions which can be said to reference to the lack of 'reflecting' activities in the team. Thus, the participant talks about 'naming', 'framing', 'moving' and lack of 'reflecting' activities as explained by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant mentions "*they (the team) listened more to external input than their team input, so, especially me*". The team not listening to a team member can be said to show the lack of inner value of Hopefulness. This generalisation can be said to show that the team lacked the inner value of Non-judgemental being. The participant also uses phrases such as "*did not include*". The phrase can be said to show the lack of Acceptance of other's views. The repetition at the end "*never did"* can be said to show the participant lacks the inner value

of Forgiveness towards the team. Thus, the inner values observed in the quote can be said to be {-H-N-A-F}, visualised as:



Participant 6 reflected on the strength of knowledge of the team and its members mentioned that,

> "*Frustrated. Frustrated! Because I'm so used to just people taking their own initiative, like, I can't imagine being in a group and not knowing what ... not ... if we talk about something, going, "I'll do that. I know how to do that. Yeah, I'll do that and I'll have it done this time" and I can't imagine not doing that. And when like I said we went to see that guy from the YMCA to do the ... he helped us with the business side, when we were there, he mentioned if we'd thought about business, and the business person in our group had said, "No". I can't imagine coming from a background of business, like a background of design and not thinking, "Yeah, I know how to do that. I'll do that". I can't imagine ... yeah, I just can't imagine it. It's just annoying.*"[Q6.16]

Step 3.1: Thematic analysis to recognise arguments made

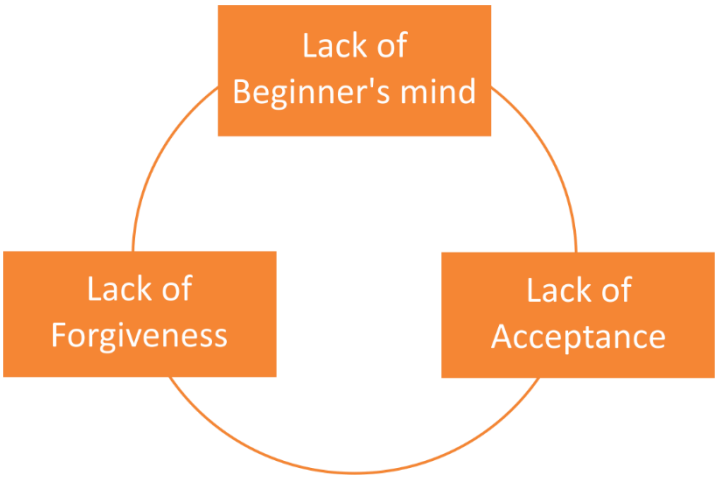
The participant explains how lack of knowledge of team members limited their inputs into the teamwork during DfSI project and was "*annoying*" to the other members of the team. The argument arising from quote can be said to be:

Argument 2/B-6.16 *The lack of knowledge or lack of ability to apply knowledge affected team members and team work adversely.*

The participant explains an example which seems to be on 'moving' activity during the DfSI project. However, the participant explains re-distributing tasks which can be considered unsuccessful attempt at 'reflecting' activity as defined by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant mentions, "*I'm so used to just people taking their own initiative"* which can be said to show the lack of Beginner's mind. This leads the participant to mention phrases such as "*Frustrated* " and "*annoying*" which show lack of Acceptance of other's views. The participant frequently repeats the "*Frustrated"* and "*I can't imagine"* which can be said to show that the participant lacks the inner value of Forgiveness towards the team which affected the teamwork during DfSI project. Thus, the inner values observed in the quote can be said to be {-B-A-F}, visualised as:



The participant further continued,

> "*It was. We were trying to delegate roles, but then there was a lot of, "I don't know how to do this and I don't know how to do that" and they were saying doing the visualisation, like Name said, "Are you doing the visualisation?" I felt like I was just expected to, 'cause he used to say, "I'm slow". I was like, "Yeah, I'm fast but there's too much of it for me to do", so I was trying to explain that there was a lot of work. I did try and delegate roles, but when people are saying, "I can't do this and I can't do that", you just feel like, 'cause I know how to do it, I just felt like I was taking more and more on. It was unfair*."[Q6.17]

Step 3.1: Thematic analysis to recognise arguments made

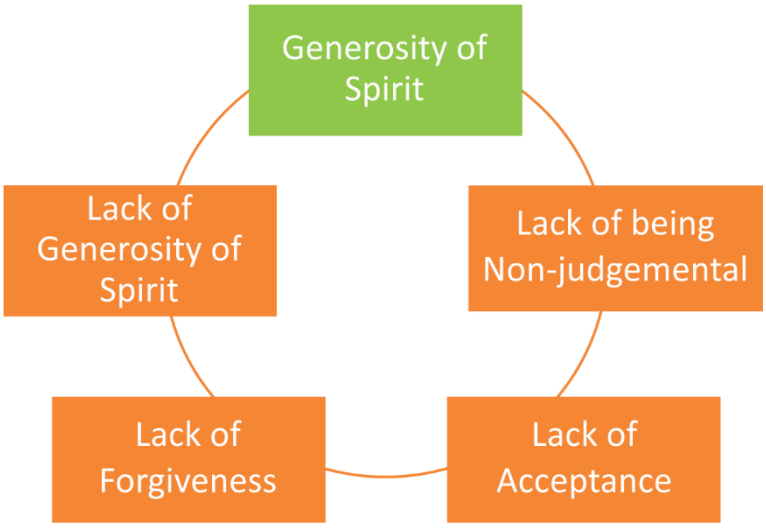
The participant explains that other members of the team mentioned that they could not perform many tasks due to lack of knowledge or ability to apply knowledge because they were "*slow*". The participant tried to delegate roles to share tasks for team work during the DfSI project. However, the participant ended up taking a lot of work load because she had the required knowledge which she considers "*unfair*". Thus, the argument arising can be said to be:

<u>Argument 2/B-6.17</u> *lack of knowledge led to uneven work load and need to delegate roles*.

The participant talks about delegating roles which can be said to be 'framing ' activity and the execution of such work can be categorised as 'moving' activity as explained by Valkenburg and Dorst (1998). The participant does not talk about 'naming' or 'reflecting' activities. Thus, the argument made can be said to be based on the 'framing' and 'moving' activities.

Step 3.2: Applying model of inner values

The participant mentions phrases such as "*I was trying to explain that there was a lot of work. I did try and delegate roles"* and *"I just felt like I was taking more and more on*" which show the participant had Generosity of spirit to accept the bigger cost of co-operation. But the participant mentions this being "*unfair*". This can be said to show the participant lacks the inner value of Non-judgemental being and lacks the inner value of Acceptance of other's views. Indeed, it is difficult to keep positive inner values when Generosity is rewarded with defection by the team. The participant mentions "*there was a lot of, "I don't know how to do this and I don't know how to do that."* The repetition can be said to show the participant lacks the inner value of Forgiveness. Thus, the inner values observed in the quote can be said to be {+G-N-A-F-G}, visualised as:



Participant 11 reflects on the strength of knowledge during teamwork during DfSI project of team B and mentions that,

"*What we had was people not knowing themselves what to do. And not being equipped with tools to find out things for project and for a decent output. I couldn't take it anymore. So we delegated roles but that did not work. It was disheartening*" [Q11.27]

Step 3.1: Thematic analysis to recognise arguments made

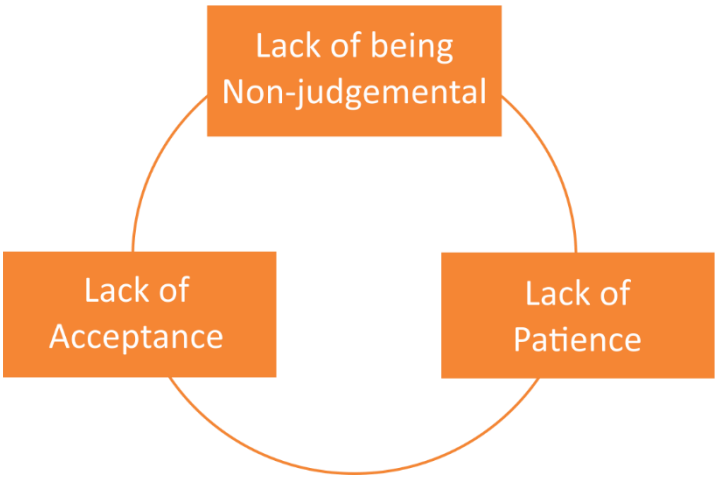
The participant explains how some members of the team could not decide their roles due to lack of knowledge during team work for DfSI projects. When the participant mentions delegating roles did not work because members could not perform related tasks. Thus, the argument that arises from the quote can be said to be:

Argument 2/B-11.27 *Lack of knowledge of some team members cause other members to be disheartened.*

The participant can be said to explain 'framing' activity by mentioning delegation of roles and can be said to be referring to 'moving' activities when mentioning "*find out things for project*". Thus, the argument made can be said to be in reference to 'framing' and 'moving' activities as described by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant makes generalisations about "*people*". This can be said to show the participant lacked the inner value of Non-judgemental being. The participant mentions "*I couldn't take it any more*" which can be said to show lack of inner value of Patience It must have been disheartening to accept views that the participant explained. None the less, the participant mentioning "*It was disheartening"* can be said to show the lack of inner value of Acceptance. The repetition of negative phrases can be said to show lack of inner value of Forgiveness. Thus, the inner values observed in the quote can be said to be {-N-P-A}, visualised as:



Step 4: Finding meaning in language for Subsection 2/B

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

The data can be said to show that certain members of the team did not consider other member's opinion during team work for the DfSI project. Because of such behaviour, the input from all members was not considered and this led to poorly though out ideas and concepts (See Argument 2/B-2.22 *The team discounted opinions and suggestions of fellow members which led to poorly thought out ideas and concepts*). The meta argument is derived from this argument as no other arguments are similar.

The data can be said to show that lack of knowledge and lack of ability or enthusiasm to apply knowledge led to negative effect on other members of the team (See Argument 2/B-6.16 *The lack of knowledge or lack of ability to apply knowledge affected team members and team work adversely* and see Argument 2/B-11.27 *Lack of knowledge of some team members cause other members to be disheartened*). The data also can be said to show that one of the negative effect was that work load was unevenly distributed between team members because some members did not have strength or ability to apply knowledge during team work for DfSI project (See Argument 2/B-6.17 *lack of knowledge led to uneven work load and need to delegate roles*). Thus, the meta-argument arising from the data can be said to be:

The lack of knowledge or lack of ability to apply knowledge led to uneven distribution of work load and distress to members of team.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: *the team discounted opinions and suggestions of fellow members which led to poorly thought out ideas and concepts*

Evidentiary quote: Q2.22

Brief summary of findings from thematic analysis: The input from some members was ignored during 'naming', 'framing' and 'moving' activities of team work during DfSI project. This led to outcomes of DfSI to be poor ideas and concepts.

Inner value observed in the data: lack of Hopefulness, lack of inner value of being Non-judgemental, lack of Acceptance and lack of Forgiveness.

Evidence: The team members express a belief that their team was not accepting input from every member, though reasons for this may vary. This belief existed during the project and such lack of hope for co-operation from the team has been recognised by applying the proposed model of inner values. Some of the reasons for non-inclusivity are expressed to be a judgemental attitude which the other members considered inappropriate and could not accept. Based on such reflection it can be said that the team may have lacked a non-judgemental attitude and a lack of acceptance during the project. Thus, the lack of non-judgemental attitude and lack of acceptance of situation can be said to have correctly recognised by applying the proposed model of inner values. This in no way means that designers should not have been judgemental of ideas presented or that members should have accepted situations as they are. The survey of inner values with expert design practitioners can be said to show how designers need to be judgemental towards ideas but not people which team B seem to have experienced. Similarly, acceptance of situation does not mean giving up but infact refers to wisdom to recognise when to change situation and what to change. The dysfunctional outcome from the situation described above can be said to arise because of lack of such wisdom on part of all team members. Such dysfunctional teamwork can be said to be lack of forgiveness which has been observed by demonstrating the model of inner values.

Findings: lack of Hopefulness (Q2.22), lack of inner value of being Non-judgemental (Q2.22) lack of Acceptance (Q2.22) and lack of Forgiveness (Q2.22) are observation as inner values of team B.

Meta-Argument 2: *The lack of knowledge or lack of ability to apply knowledge led to uneven distribution of work load and distress to members of team.*

Evidentiary quote: Q6.16, Q6.17 and Q11.27

Brief summary of findings from thematic analysis: The lack of knowledge and the lack of enthusiasm and ability to apply knowledge led some team members to take more responsibility than others. The team members tried to delegate roles but other team members did not or could not contribute. This had negative effect on team work during DfSI project.

Inner value observed in the data: lack of inner value of being Non-judgemental (Q6.17,Q11.27), lack of Acceptance (Q6.16, Q, 6.17, Q11.27), Generosity (Q6.17), lack of Beginner's mind (Q6.16), lack of Patience (Q11.27) and lack of Forgiveness (Q6.16, Q6.17,Q11.27)

Evidence: The team members explain how their expectations were not met by their team. The members either expected initiative or support from their team in different circumstances pertaining to teamwork and workload distribution and this can be said to be pre-conceptions which led to frustration within members of team B. Such frustration has been repeatedly expressed by different members of the team while describing the knowledge within their team which can be said to show that the team may ot have accepted the situation and taken essential steps to change it. Thus, it can said that the observation of lack of the inner value of Beginner's mind and lack of Acceptance made after applying the proposed model of inner values can be confirmed.

Some team members decided to help re-distribute workload but only one member of the team mentioned this as the activity she had to perform, which can be said to show that generosity of spirit to accept the added workload of re-distributing tasks may not have been taken by all members. On the other hand, many members of team B explain that their team members lacked the initiative to aid teamwork by accepting a bigger share of workload which is lack of generosity of spirit. Thus, the generosity of spirit observed by applying model of inner values can be said to be a combination which this research cannot address in it's current methodology but the presence of generosity may have helped team re-distribute workload while lack of generosity may have made this process difficult. However, the generalisations made by participants from team B about their team members have been said to show lack of non-judgmental attitude. The belief that team members were shy of taking responsibility, or the reason for such lack of contribution being lack of knowledge were considered unfair teamwork which led to distrust and members could not contribute to eachother's understanding effectively and cordially. This can be said to confirm the observation of lack of non-judgemental attitude but also lack of forgiveness.

Findings: Lack of inner value of being Non-judgemental (Q6.17,Q11.27), lack of Acceptance (Q, 6.17, Q11.27), lack of Patience (Q11.27), generosity of spirit (Q6.17, Q11.27) and lack of Forgiveness (Q6.17,Q11.27) are observations as the inner values of the team.

Summarization of Findings and observation for subsection 2/B

Thematic analysis

Meta-Argument 1: *The team discounted opinions and suggestions of fellow members which led to poorly thought out ideas and concepts*

The data can be said to show that certain members of the team did not consider other member's opinion during team work for the DfSI project. Because of such non-inclusivity, the input from all members was not considered and this led to poorly though out ideas and concepts (See argument 2/B-2.22).

Meta-Argument 2: *The lack of knowledge or lack of ability to apply knowledge led to uneven distribution of work load and distress to members of team.*

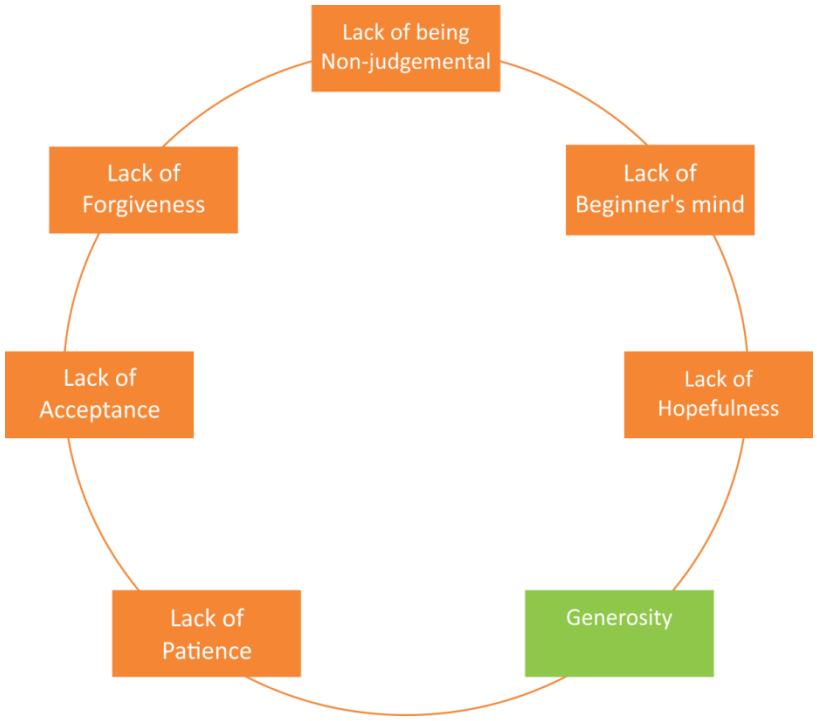
The data can be said to show that lack of knowledge and lack of ability or enthusiasm to apply knowledge led to negative effect on other members of the team (See Argument 2/B-6.16 *The lack of knowledge or lack of ability to apply knowledge affected team members and team work adversely* and see Argument 2/B-11.27 *Lack of knowledge of some team members cause other members to be disheartened*). The data also can be said to show that one of the negative effect was that work load was unevenly distributed between team members because some members did not have strength or ability to apply knowledge during team work for DfSI project (See Argument 2/B-6.17 *lack of knowledge led to uneven work load and need to delegate roles*).

Inner values

The data can be said to show that certain members of team C were judgemental towards the strength of knowledge and towards the contributions to the project by other members of the team. Such behaviour can be said to stem from what participants speculate as lack of co-operation on part of the certain members of the team. However, such members explain that opinion from certain discipline was not applicable which can be said to show lack of Beginner's mind and lack of generosity of spirit. When members could not contribute or when contributions of other members was not considered, it led to inter-personal problems which can be said to show lack of acceptance of situation and lack of forgiveness. Thus, the inner values of the team B with regard to building strength of knowledge are lack of inner value of being Non-judgemental (Q2.22, Q6.17, Q11.27), lack of Beginner's mind (Q6.16), Generosity of spirit (Q6.17, Q11.27), lack of Patience (Q11.27), lack of Hopefulness (Q2.22),

lack of Acceptance (Q2.22, Q6.16, Q6.17, Q11.27) and lack of Forgiveness (Q2.22, Q6.16, Q6.17, Q11.27), visualised as:

Figure 11: Inner values of team B towards sharing and building strength of knowledge for effective teamwork during DfSI project



Reflection

The participants primarily focus on disadvantages of lack of knowledge. It is unclear if some of the members actually lacked knowledge or if the other members just considered the members to not have knowledge. A key observation could be that 'framing' activity is primarily affected by non-inclusivity. However, it is clear that all members of team B were dissatisfied with the collective knowledge that was created either because everyone's opinion was not included, or because some members did not contribute, or because some members took more responsibility than others. The effect of this is explained in 'moving' activity where the work load was uneven, the ideas generated were not well thought out and there was overall displeasure within team work during DfSI project.

1.2.3 Analysis of team C

Step 3: Making Observation for Subsection 2/C

Participant 4 reflects on strength of knowledge in the team and mentions,

> "*Again, we were talking through what views we'd got on the presentation, and Name just said, "Oh we should do it at the gate", and actually said, "Oh, it's a shame you didn't carry it forward", but then it was never mentioned earlier on, and so if she had mentioned it earlier on we probably could have picked it up as an idea and then gone on with it, so perhaps ... That's the most enthusiastic I've ever saw her, and so perhaps if she'd piped up earlier, she could have done that and so her enthusiasm might have increased or something, but ...*"[Q4.29]

Step 3.1: Thematic analysis to recognise arguments made

The participant describes an incident where members became enthusiastic at different stages and shared their knowledge. This helped to drive the project. The argument which can be said to be drawn from the quote is:

Argument 2/C-4.29 *Knowledge from different members of team came into play at different stages of the project to drive enthusiasm of the team*

The member describes an ideation activity which as described by Valkenburg and Dorst (1998) can be categorised as 'moving' activity. The participant literally talks about the project moving forward due to enthusiasm of different members of team at different stages of the team work during DfSI project.

Step 3.2: Applying model of inner values

The participant mentions the incidence without thinking good or bad, fair or unfair. The participant only mentions "*it's a shame*" which can be said to show the participant had the inner value of Non-judgemental being. Thus, the inner values observed in the quote can be said to be {+N}, visualised as:

Further the participant mentions,

> "*I think it depends what stage you're on in the project, 'cause people are good, or their strengths come into play at different stages of the project, but for me I think it's near*

the end, kind of like project manager type thing, pulling everything together and getting everyone on track. Where at the beginning, like the ideation bit, I can't like come up with an idea, like with other people it's just shouting out these ideas. If someone says something, I can think about whether it's good or bad; I can add to it and change it, but I find it hard to just think of something out of thin air, so I'm better later on when things start going ... A bit like, different people are better at different stages, so some people would be more prominent or take a bigger role at different stages."[Q7.3]

Step 3.1: Thematic analysis to recognise arguments made

The participant describes the different stages of the project where the members took different responsibilities. The argument that may be drawn from the quote can be said to be:

Argument 2/C-7.3 *The different members took different responsibilities during various stages of the DfSI project*

The participant talks about all stages of the project. The participant explains ideation which, as described by Valkenburg and Dorst (1998), is the 'moving' activity. The project also talks about project planning and management which are the 'framing' activities. The participant does not talk about problem understanding from brief which is the 'naming' activity but mentions revisiting the ideas which is the 'reflecting' activity. Thus, the argument can be said to be regarding the 'framing' 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mentions "*strengths come into play at different stages of the project*" which can be said to show Hopefulness for co-operation. The participant mentions "*different people are better at different stages*" which can be said to show that the participant and the team had the inner value of Acceptance. Thus, the inner values observed in the quote can be said to be {+H+A}, visualised as:

Participant 4 reflects on the strength of knowledge in team C and mentions,

"*I did feel like I was putting more into this than other people were, because obviously I was using my other time to think about things and then, if people just had, like I had one instance where we had the interim with Client and so I spent all weekend putting a*

presentation together and I asked one member of team whether they could do one thing for me, and she said, "Yeah, but not today 'cause it's Sunday, obviously" and I was like, "Why obviously?" and she was like, "Well, I'm out doing stuff". It's like, "Well I could have been out doing stuff as well, but I'm actually doing this presentation. I've spent my whole weekend doing this and I'm asking for one little thing to be done", and so it had to be done the next day... I just let it go. Just like, "Right then. We'll have to do it tomorrow". I didn't really say anything about it to her, but another member of the team mentioned it to me afterwards, so it was a bit weird"[Q4.28]

Step 3.1: Thematic analysis to recognise arguments made

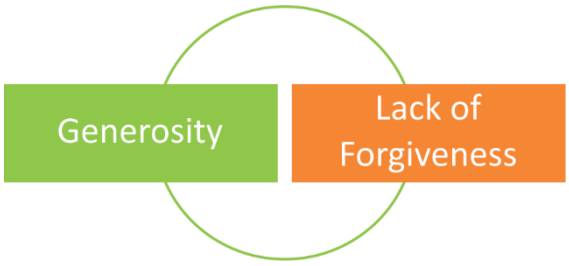
The participant describes an incidence to demonstrate that she had to put in more hours while another member did not do the same. The argument made could be said to be:

Argument 2/C-4.28: *personal time and attention was donated by few members*

The member describes one of the tasks which denotes that participant is talking about 'moving' activities during the project, as explained by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant exclaims "*was using my other time*" which can be said to show inner value of Generosity of spirit to accept the larger share of price for co-operation. However, the participant mentions "*I could have been out doing stuff as well, but I'm actually doing this*", she blames the team member for not getting involved. This can be said to show lack of Forgiveness. Thus, the inner values observed in the quote can be said to be {+G-F }, visualised as:



Participant 7 mentions,

"*If we had a different technology person it would have been a better answer, because she didn't really contribute and I can't think of anything that she contributed at all, never mind anything to do with technology, so really it was just business and two designers... I think honestly it would have been better if ... one thing would have been better, if we didn't have that person in our group. I always talk about ... because not only did she not do anything, it was like a bit of a - I can't think of the word - like a bit of a drain, I don't know, because you have to try and think up stuff for that person to do and then you've got to spend time thinking about that, and then you've got to spend*

time coming up with a plan and like, draw out all, "Can you recreate this", or, "Can you do this? Can you do that?" Then you've got to spend time explaining it to the and ... it just like, taking up loads of time and energy that it didn't need. I think if there was three of us we could have just got on better" [Q7.12]

Step 3.1: Thematic analysis to recognise arguments made

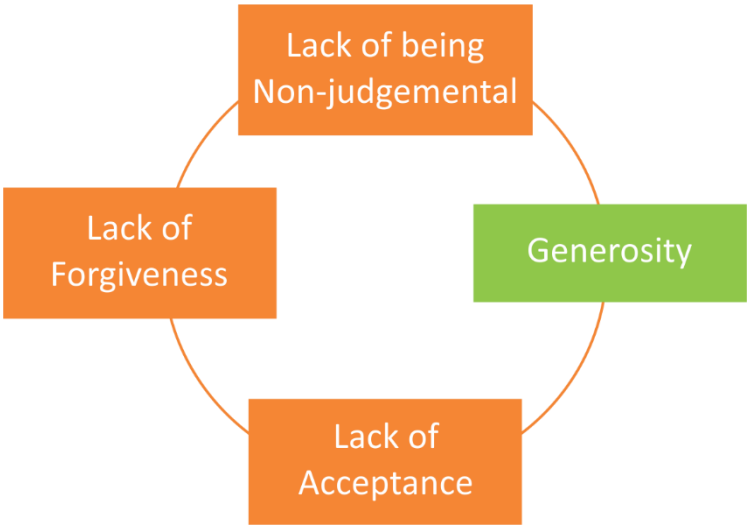
The participant mentions that team member with technology background did not know what to contribute due to lack of knowledge so tasks had to be assigned which was distraction for the team. The argument that can be said to be made by the participant is

Argument 2/C-7.12: Having a team members who did not contribute due to lack of knowledge, affected the team work during DfSI project

The participant talks about entire project so the argument can be said to be made for 'naming', 'framing', 'moving' and 'reflecting' activities as explained by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant mentions the non-contributing team member as a "*drain*" which can be said to show the lack of inner value of Non-judgemental being. The participant mentions that, "*you have to try and think up stuff for that person to do"* and that *"you've got to spend time coming up with a plan...'Can you recreate this', or, 'Can you do this? Can you do that?'"* and *"you've got to spend time explaining it to her".* The participant mentions taking such efforts for the team member which can be said to show Generosity of spirit. Following this, the participant uses phrase such as "*If we had a different technology person...*" in hinDfSI projectght which can be said to show lack of Acceptance of other's views. Indeed, it is difficult to accept views when there are none. The repeatedphrases "*you've got to...*"can be said to show the lack of inner value of Forgiveness. Thus, the inner values observed in the quote can be said to be {-N+G-A-F}, visualised as:



Step 4: Finding meaning in language for Subsection 2/c

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

The data can be said to show that different members became enthusiastic at different times during the DfSI project (See Argument 2/C-4.29 *Knowledge from different members of team came into play at different stages of the project to drive enthusiasm of the team*). Different members took responsibility of different tasks based on their strength of knowledge (See Argument 2/C-7.3 *The different members took different responsibilities during various stages of the DfSI project*). Such data can be said to lead to the meta-argument that *Different strengths came into play in the team, at different stages of the project*.

The members of team C considered that not all members donated equal amount of time (See Argument 2/C-4.28: *personal time and attention was donated by few members*). Further, the contribution from some members was low due to lack of knowledge or ability to contribute to the project (See Argument 2/C-7.12: *Having a team members who did not contribute due to lack of knowledge, affected the team work during DfSI project*). Such team members were distraction to the team and had to be assigned tasks during the DfSI project. Thus, the meta-argument arising from the data can be said to be *Lack of knowledge or lack of ability or enthusiasm to apply knowledge put an uneven burden on other members of the team.*

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: *Different strengths of knowledge came into play in the team, at different stages of the project.*

Evidentiary quote: Q4.29 and Q7.3

Brief summary of findings from thematic analysis: The team applied their knowledge at different stages of the project sharing the responsibilities where appropriate. Different members became enthusiastic at different times during the project to keep the project moving forward.

Inner value observed in the data: being Non-judgemental (Q4.29), Hopefulness for co-operation (Q7.3) and Acceptance (Q7.3)

Evidence: During the teamwork for DfSI project, exchange of skills and knowledge was important factor so that appropriate contribution was made by different members of the team. Hopefulness that every team member will contribute can be considered important to initiate such an exchange of strengths of knowledge. Further, a Non-judgemental attitude and Acceptance toward people and situations is required for teamwork during DfSI project to continue the exchange of strengths of knowledge. When the teamwork during DfSI project can show as they are, the exchange of strengths of knowledge was possible, it can be said that the team may have had the inner value necessary. Evidence suggests that the team could initiate exchange of skills successfully because they considered their knowledge complementary (Q7.3, Q4.29). Thus, the inner value of Hopefulness is confirmed in the evidence. Evidence further suggests that the team members did not judge the strength of knowledge being exchanged in terms of good or bad, fair or unfair. Thus, the inner value of being Non-judgemental is a valid observation in the evidence (Q4.29, Q7.3). Evidence also suggests that the team accepted each other's contributions (Q7.3). Thus the observations made by applying the proposed model of inner value can be considered to be a valid observation.

Findings: The inner value of being Non-judgemental (Q4.29), Hopefulness for co-operation (Q7.3) and Acceptance (Q7.3) were recognised as the inner values of the team.

Meta-Argument 2: *Lack of knowledge or lack of ability or enthusiasm to apply knowledge put an uneven burden on other members of the team.*

Evidentiary quote: Q4.28 and Q7.12

Brief summary of findings from thematic analysis: Certain members lacked enthusiasm to apply knowledge while another lacked ability to apply knowledge. Such incidences hindered the team work because other members of the team had to assign tasks to them.

Inner value observed in the data: Generosity of spirit (Q4.28, Q7.12), lack of inner value of being Non-judgemental (Q7.12) and lack of Acceptance (Q7.12)

Inner values: Generosity of spirit (Q4.28, Q7.12), lack of inner value of being Non-judgemental (Q7.12) and lack of Acceptance (Q7.12)

Evidence: The teamwork during DfSI project needs to account for contribution from all the stakeholders and has to give equal importance and not prioritise inputs. Thus, sometimes non-contributing teamwork during DfSI project can require more efforts to get same contributions than other teamwork during DfSI project or stakeholders. The Generosity of spirit of the teamwork during DfSI project comes into play to work harder for better teamwork during DfSI project. Any judgemental behaviour from teamwork during DfSI project can create further resistance to the contributions. Also, the teamwork during DfSI project needs to accept such situation to move on with the teamwork during DfSI project. Evidence suggests that the team worked toward inclusion of other members into the teamwork during DfSI project by working out of the way (Q4.28). Thus, the inner value of Generosity of spirit is a valid observation for the team. Evidence further can be said to show that some of the team members did not think about such work in terms of good or bad (Q4.28) but some others considered this very draining (Q7.12). Indeed it must be difficult to go the extra mile without being judgemental. As contradictory evidence exist (Q7.12), it cannot be determined if the team was having or lacking the inner value of being Non-judgemental. The evidence can be said to show that not everyone accepted the situation and therefore, the lack of inner value of Acceptance is a weak observation for the team (Q7.12).

Findings: Generosity of spirit (Q4.28, Q7.12) and lack of Acceptance (Q7.12) are recognised as the inner values of the team.

Summarization of Findings and observation for subsection 2/C

Thematic analysis

Meta-Argument 1: *Different strengths of knowledge came into play in the team, at different stages of the project.*

The team applied their knowledge at different stages of the project sharing the responsibilities where appropriate (See Argument 2/C-7.3 *The different members took different responsibilities during various stages of the DfSI project*). Different members became

enthusiastic at different times during the project to keep the project moving forward (See Argument 2/C-4.29 *Knowledge from different members of team came into play at different stages of the project to drive enthusiasm of the team*). The participant mention such arguments with regard to 'naming', 'framing' and 'moving' activities as explained by Valkenburg and Dorst (1998) but they do not explain if argument applies to any 'reflecting' activities for team work during the DfSI project.

Meta-Argument 2: *Lack of knowledge or lack of ability or enthusiasm to apply knowledge put an uneven burden on other members of the team.*

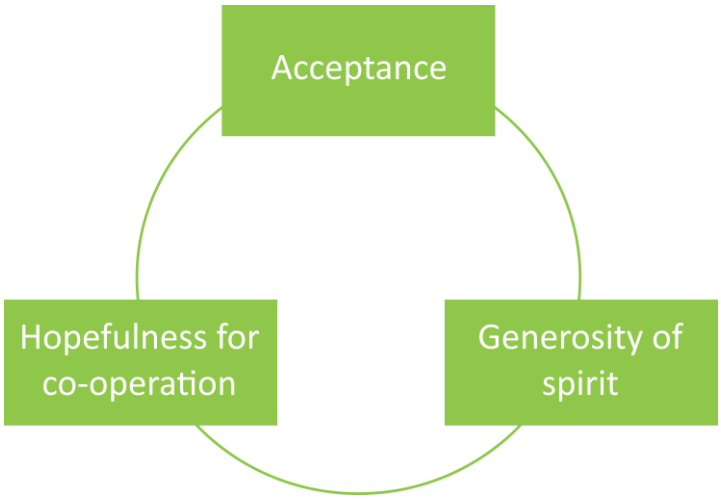
Certain members lacked enthusiasm to apply knowledge and did not contribute equal amount of time as other members of the team (See Argument 2/C-4.28: *personal time and attention was donated by few members*) While another member lacked ability to apply knowledge (See Argument 2/C-7.12: *Having a team members who did not contribute due to lack of knowledge, affected the team work during DfSI project*). Such incidences hindered the team work because other members of the team had to assign tasks to them. The arguments are made with regard to entire project but again the examples provided depict reflections on 'framing' and 'moving' activities.

Inner values

During the teamwork for DfSI project, exchange of skills and knowledge was important factor so that appropriate contribution was made by different members of the team. Hopefulness that every team member will contribute was considered important to initiate such an exchange of strengths of knowledge (Q7.3, Q4.29). When certain members could not apply their knowledge, the team worked toward inclusion of such members into the teamwork during DfSI project by going out of the way (Q4.28). This can be said to show the inner value of Generosity of spirit demonstrated by the team. Further, a Non-judgemental attitude and Acceptance toward people and situations was required for teamwork during DfSI project to continue the exchange of strengths of knowledge. Some of the team members did not think about such work in terms of good or bad (Q4.28) but some others considered this very draining (Q7.12). Indeed it must be difficult to go the extra mile without being judgemental. As contradictory evidence exist in the data it cannot be determined if the team was having or lacking the inner value of being Non-judgemental. However, the members of the team accepted the lack of knowledge and helped out their team members to contribute towards the project which can be said to show that the team had the inner value of

Acceptance in the team (Q7.3). Thus, the inner values of the team are Generosity of spirit (Q4.29, Q7.12), Hopefulness for co-operation (Q7.3) and Acceptance (Q7.3).

Figure 12: Inner values of team C toward sharing and building strength of knowledge for effective teamwork during DfSI project



Reflection

The team members made arguments on entire project but examples they provided are mostly on 'framing' and 'moving' activities. It seems that strength or ability to apply knowledge varied during team work applied throughout the project. This is associated to enthusiasm of different members coming into affect at different stages of the project. The lack of knowledge or lack of ability of certain members added to the workload of other members of the team but it can be said that the team has engaged into such added efforts for betterment of team work during DfSI project.

1.3 Analysis of theme 3: The effect of leadership on team work during DfSI project

Step 2: Creating Data matrix to organise data:

Participant no.	Quotes that support effective teamwork during DfSI project		Quotes that refute effective teamwork during DfSI project	
Sub-section 3/A: Team A	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	1.22 1.24 3.17 10.4 12.20 12.29	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.1.	12.6 12.10.	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.1.
Sub-section 3/B: Team B	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	11.23	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.2.	2.5 2.6 2.21 6.20 11.2	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.2.
Sub-section 3/C: Team C	Quote Number	Where to locate in the thesis		
	4.2 4.25 7.13	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.3.		

1.3.1 Analysis of team A

Step 3: Making Observation for Subsection 3/A

Participant 1 mentions that the

> "*I'd say that I had quite a strong input. I'd say there was probably me, then another guy who kind of maybe took the lead to a certain extent. I'd probably say I was secondary to him, just because he's got a lot of strong ideas and strong opinions which is brilliant. Like, it really does help to guide us.*"[Q1.22]

Step 3.1: Thematic analysis to recognise arguments made

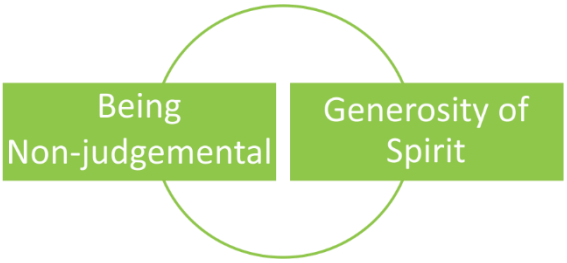
The participant mentions leadership was shared by the participant and another member of the team but everyone contributed to the decision making process. The argument presented can be said to be

Argument 3/A-1.22: *Leadership was shared but one member was considered primary and another secondary*.

The participant talks about entire project. Thus, the argument made can be considered to be for 'naming', 'framing', 'moving' and 'reflecting' activities as explained by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant reports the leadership as helpful but not in terms of fair or unfair. Thus, the participant is reporting without judgements and can be said to show the inner value of being Non-judgemental. The participant mentions another member had stronger ideas and opinions and says "*probably I was secondary*". The ability to accept the smaller share of leadership can be said to show the inner value of Generosity of spirit in the team. The value of sharing the leadership is important for the teamwork during DfSI project practice because it means decisions are co-owned. Thus the Generosity of spirit shown by the participant has an obvious value for effective teamwork during DfSI project. Thus, the inner values observed in the quote can be said to be {+G+N}, visualised as:



The participant continues,

> "*He has a lot of good ideas and a lot of strong ideas and he comes up with hundreds – literally hundreds – of them. And I'd say that's probably where I step in to say these are all brilliant ideas but we don't have time to do them all. So I'd say how many we can do and the rest of the group kind of gets together and we all kind of try and direct it in the way that we think is going to suit the clients' needs. So everyone kind of sticks to their own strong points and comes up with suggestions to add into the proposals and whatever else. So, I think it has been a team effort this semester definitely.*" [Q1.24]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains sharing ideas and decision making with entire team. Then the team took bigger responsibility in tasks based on their strengths. Thus, the argument being made can be said to be:

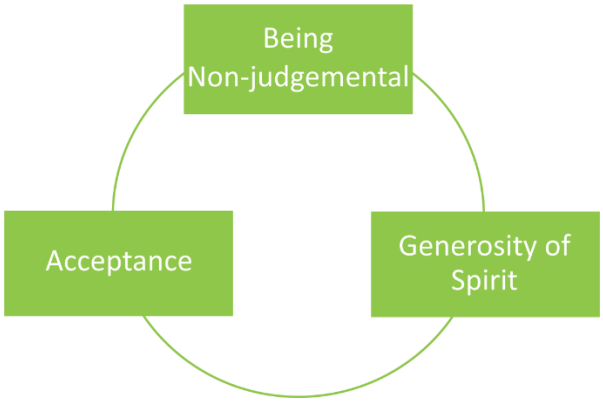
Argument 3/A-1.24: *Though one member took lead, others shared decision making process and leadership during the DfSI project.*

The participant talks about entire project. Thus, the argument made can be considered to be for 'naming', 'framing', 'moving' and 'reflecting' activities as explained by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant mentions that the sequence of leadership was based on the steps of teamwork during DfSI project but does not judge it as good or bad, or fair or unfair practice. The participant mentions "*the group kind of gets together and we all kind of try and direct it in the way that we think is going to suit the clients' needs"* which can be said to show the inner value of Non-judgemental being. The participant explains the sequence that the designer created ideas, while the participant shortlisted these ideas based on certain criteria. The other team members contributed based on their strengths and the task at hand. The participant further mentions "*everyone kind of sticks to their own strong points and comes up with suggestions to add into the proposals"* which can be said to show the inner value of

Generosity of spirit the team shared when dividing the leadership amongst themselves. Finally, the participant mentions "*it has been a team effort this semester"* which can be said to show the inner value of Acceptance. The importance of shared leadership is important in teamwork during DfSI project due to the co-owned decisions it creates. Thus these inner values shown are leading towards an effective teamwork during DfSI project practice. Thus, the inner values observed in the quote can be said to be {+N+G+A}, visualised as:



Participant 3 mentions,

> "*I mean there one person who did this planning in the beginning of the project. And everyone agreed, so it was made really well that, you know, this is what we're supposed to do. Yeah, it was mainly by one person.*"[Q3.17]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains how the team agreed to the planning done by one of the members of the team and contributed to the decision making process. Thus the argument can be said to be:

Argument 3/A-3.17: *One of the members made the project plan and others agreed to and contributed to it.*

The participant talks specifically about the planning at beginning. Thus, by applying explanation from Valkenburg and Dorst (1998) the argument made can be said to be with regard to 'framing' activity.

Step 3.2: Applying model of inner values

The participant does not think in the terms of good or bad, fair or unfair. She reports "*it was made really well".* Thus it can be said that the participant can be said to show the inner value of being Non-judgemental. Thus, the inner values observed in the quote can be said to be {+N}, visualised as:

Participant 10 mentions,

> "*I thought and some other members of the group as well, might say Name is kind of the team leader, he always likes to take the role of the leader. So he wanted to do this and then he sort of got a little upset if you don't hang on like let's do this, 'cause he thought he knew better. So if more of the people, if we could have done what everyone wanted, rather than one person and focused more on some of the tasks. Like he wanted to focus on one of the task Scarla thing, which I didn't agree with but because he was really upset and really wanted to do it, I was just like, this is going to take all the time arguing and won't get past it. We tried discussing for a bit and then decided to work on it and come back to further discussions. It was a long process but then we were convinced that our decision was correct because of that... I guess I would be frustrated if I was not meditating. But meditation let me remain calm and focus on what's important. I thought, we could either move ahead or get stuck here and the choice was obvious for me."*[10.4]

Step 3.1: Thematic analysis to recognise arguments made

The participant mentions that when leading member of the team would insist on a certain point, the team would not keep arguing. Instead they would discuss the point for a while and then try out small task on the point, then come back and discuss again with improved understanding of the consequences. Thus, the argument presented can be said to be that

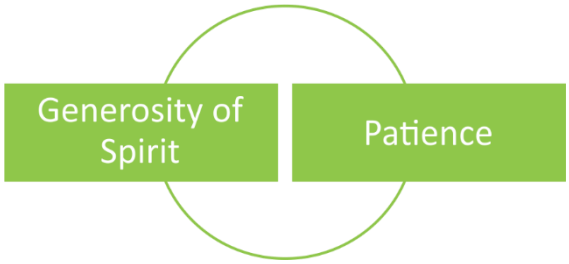
Argument 3/A-10.4: *The team chose action and reflection instead of prolonged discussion to build consensus and meditation helped to calmly go through the process.*

The quote explains an important aspect of shared leadership in their team A which was improved due to the practice of AbMT intervention. The participant talks about multiple aspects of design based team work. Thus, the participant can be said to make the argument with respect to the 'naming', 'framing', 'moving' and 'reflecting' activities. The quote also reveals how meditation helped the team work during DfSI project.

Step 3.2: Applying model of inner values

The ability to put the team and the task before own ego can be said to show the inner value of Generosity of spirit that the team shared seen in the thought process the participant, "*this is going to take all the time arguing and won't get past it*". So the participant decided to accept the smaller share of discussion to save time of the whole group. Further the inner value of Patience is seen in the discussion and practice iteration that the participant mentions in the

sentence "*We tried discussing for a bit and then decided to work on it and come back to further discussions*". Thus, the inner values recognised lead to effective teamwork during DfSI project. Thus, the inner values observed in the quote can be said to be {+G+P}, visualised as:



Participant 12 mentions,

> "*it actually personally made me step up a bit further, because I had to then be, I felt I was the face of our team in the community 'cause I'd made a lot of the relationships in the community and I talked to a lot of the people. I mean, other people in the group had as well, but it just turned out that when I'd been to Ashington I'd talked the key players in Ashington... I mean, other members of our team as well, got, Name was as well, but they didn't seem to want to be that person either. No-one really wanted to be the outright leader, so I think due to that fact, it motivated me because it was almost, you know, it was my face, it was me who was talking to these people and out building relationship, and so it, I almost had a more vested interest in it, and I felt like it was actually more meaningful so in our presentation I was defending the community to our client and vice versa and it was a real ... I got quite involved! It was good.*"[Q12.20]

Step 3.1: Thematic analysis to recognise arguments made

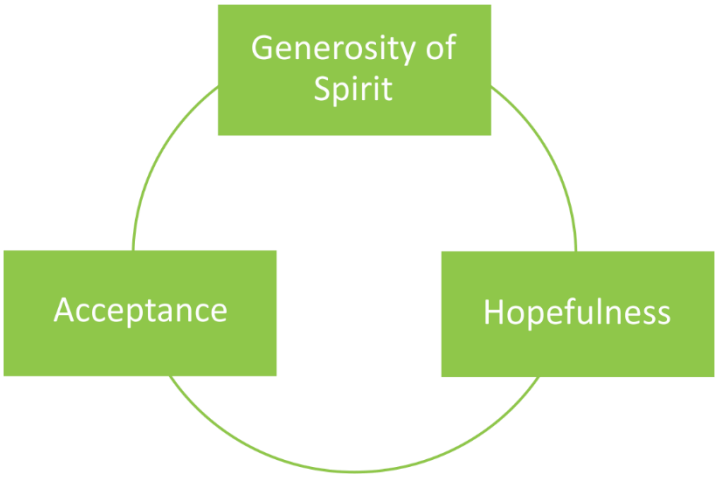
The participant stepped up when no one in the team wanted to take leadership, by representing the group in the community, which made the participant feel like face of the team. The participant mentions that the contact with community inspired him, which led to motivation, enthusiasm and a sense of leadership in him, which in turn affected the team, during the teamwork during DfSI project. The argument presented is that

Argument 3/A-12.20: *Being the representative of the team was a motivating factor*.

The participant can be said to be talking about 'moving' activities as explained by Valkenburg and Dorst (1998). However, the participant may also be talking about 'naming' and 'framing' activity that the team conducted with the community while trying to apply an inclusive design process.

Step 3.2: Applying model of inner values

The participant mentions. "*No-one really wanted to be the outright leader, so I think due to that fact, it motivated me*". The phrase can be said to show the inner value of Generosity of spirit. Further phrases such as "*made me step up a bit further*" can be said to show the inner value of Hopefulness for co-operation which the participant brought to the team. The phrase "*in our presentation I was defending the community to our client and vice versa and it was a real ... I got quite involved!"* can be said to the inner value of Acceptance. Thus, the inner values observed in the quote can be said to be {+G+H+A}, visualised as:



The next quote 12.9 from Participant 12 has been presented as two sub-quotes because it provided two different arguments. However, it has not been broken into two separate quotes during analysis or inner values because the sub-quotes depend on each other for meaning. The sub-quotes focus on two separate but interrelated things.

> "*I sort of try and internalise it and makes me even more focused to get on with my work and I just try and keep really calm about it and just sort of get on with it.... the meditation that we did, it helped me do this to certain extent, but I guess it only works so much... and that's where you see me flip between the two sides. Sometimes I've had enough, and I just go, "Right, we need to get to a certain point" and I get really bossy, but then other times, I'm just like, "I just need to get on with it". You know, you do whatever you need to do, just get on with it, and so it's like an internal conflict between ... 'cause I know my social skills aren't that great when I get to that place - the bossy place - and also the sort of ring fence place as well, and so trying to... I'm trying to be engaged, but I'm also stressed and I want to get on with my work and I'm just trying to be nice, but I don't really want to be and so ... it is also same with, that's not just for me or Name, that was also with my team mates as well... I suppose you know, doing things like the meditation helps me find, like manage that to a certain extent*" [12.29.1]

Step 3.1: Thematic analysis to recognise arguments made

The dichotomy of working in the teamwork during DfSI project team is explained by the participant as being in "*bossy place - and also the sort of ring fence place".* The participant

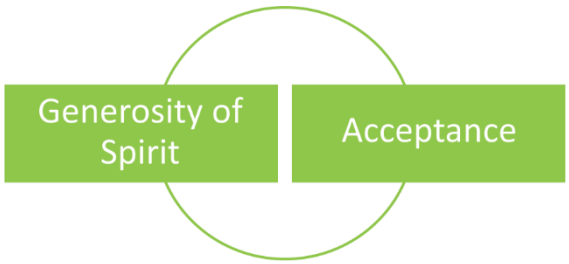
explains the inner struggle associated with this as being involved yet stressed at both the positions. The argument presented can be said to be

Argument 3/A-12.29.1: *Meditation helped team members to switch calmly between the leading and the supporting positions helping teamwork during DfSI project.*

The argument made can be said to be in reference to different stages and therefore, it can be said that the argument refers to 'reflecting' activity as explained by Valkenburg and Dorst (1998) which is required to switch roles.

Step 3.2: Applying model of inner values

In the quote above, phrase "*get on with it....*" can be said to show Generosity of spirit. Also the participant mentions "*I'm trying to be engaged, but I'm also stressed and I want to get on with my work and I'm just trying to be nice, but I don't really want to be*" can be said to show Acceptance. The participant can be said to show being judgemental of self while mentioning "*my social skills aren't that great*". Thus, the inner values observed in the quote can be said to be {+G+A}, visualised as:



The quote is further analysed for its information on meditation. The participant wants to lead and also has individual tasks to complete during the project. The participant mentions that when he is in leadership position then he is worried about his individual tasks. Therefore, the participant step aside from the leadership role and switches to the side to get on with work. But the responsibilities associated with leadership distract him. The participant reports that this was not only his personal experience but also the experience of his team mates. The participant explains that his social skills are not good in both the roles. He can become too bossy or too quite. He credits meditation intervention with helping him balance between the two roles and the calmly switch between roles. These are the findings on the role of meditation intervention on the teamwork during DfSI project.

The participant continues,

"*I suppose you know, doing things like the meditation helps me find, like manage that to a certain extent. Because you know you just take a second to think, "Well, actually, it's just a project. We've got time. We can still " and you come at it with fresh eyes, and you're like, "Okay", and so sometimes in the morning I come back and I'll be raring to go again. I'll be enthusiastic, engaging and encouraging like, "Yeah, come on guys, we can do this" and then by the afternoon nothing else got done, so I'll get really frustrated again, and Name would be like ... a couple of times Name would say to me, "Are you okay? You look like you're about to explode" or, "I feel like you're really stressed out" but it's funny 'cause I was quite calm but I think he could tell where I was at*" [12.29.2]

Step 3.1: Thematic analysis to recognise arguments made

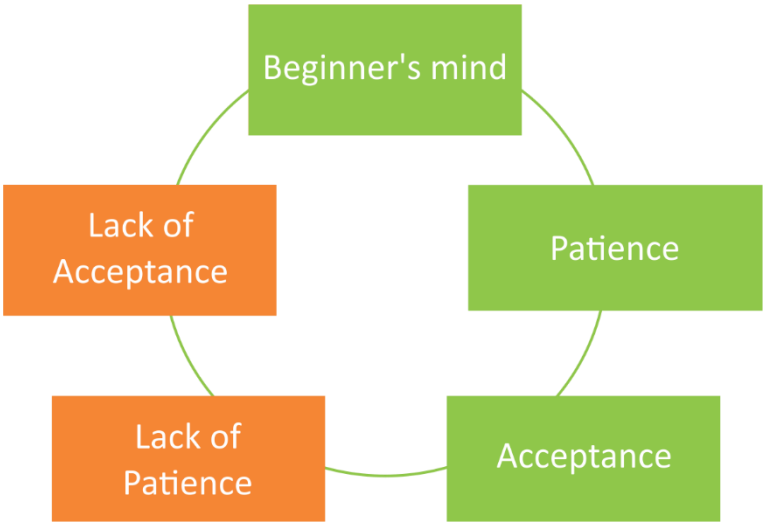
The participant mentions how the meditation practice in the morning helped him manage own behaviour and "*come at it with fresh eyes*" which provided him enthusiasm. Thus, the argument presented can be said to be

Argument 3/A-12.29.2: *meditation helped the members come at teamwork during DfSI project work with fresh eyes.*

The participant mentions all stages within the project, which, as explained by Valkenburg and Dorst (1998) can be categorised into 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant can be said to show the inner value of Patience being gained in the phrase "*it's just a project. We've got time. We can still "* and can be said to show the inner value of Beginner's mind being developed in the phrase *"you come at it with fresh eyes*". The phrase "*I'll be enthusiastic, engaging and encouraging...*" can be said to show the inner value of Acceptance and the phrase "*by the afternoon nothing else got done, so I'll get really frustrated again*" lack of Patience. The participant further notices how the day to day life affects a teamwork during DfSI projecter to get back to the routine mental state in a few hours. The participant mentions how this leads to the feeling of being "*stressed*" which can be said to show the lack of the inner value of Acceptance of other's views. Thus, the inner values found in the quote are Patience Beginner's mind, Acceptance and Patience is an important finding for the research. Thus, the inner values observed in the quote can be said to be {+B+P+A -P -A }, visualised as:



With regard to meditation, the participant mentions having fresh perspective. This perspective helps the participant be motivated, re-evaluate the value of things such as time, project, participation etc. The participant mentions being able to be enthusiastic and inclusive due to the fresh perspective, which affected the teamwork during DfSI project positively. However, the participant adds that the perception of work not getting done would bring the participant back to an unsettled state of mind. The participant brings to notice the affectivity of meditation intervention and challenge in maintaining the Beginner's mind.

Participant 12 mentions that

> "*I think because we're self-lead, so we're allowed to do what we like, basically, and if someone had allocated team roles or someone in authority, so if someone like our tutor or someone had encouraged us to have maybe a team leader or a , I think people would have not ... people were trying to scope out their roles, and trying to find where they fit in and that process took a lot of time, which could have been used doing the project, if you see what I'm saying. So maybe it was the style of the actual project itself. I mean, I was happy with the project. I think it went well. I just was frustrated for a lot of it*." [Q12.6]

Step 3.1: Thematic analysis to recognise arguments made

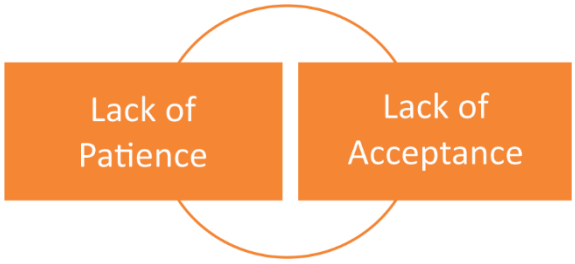
The participant mentions that the scoping of role within team took a lot of time and effort, because leadership or hierarchy was not assigned between the team members. The participant presents the argument that.

Argument 3/A-12.6: *Extra time and efforts were required by members to scope out their roles within the team due to lack of formal leadership*

The participant explains the assigning of role which can be categorised as 'framing' activity as explained by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant describes "*that process took a lot of time, which could have been used doing the project*" and remarks "*I just was frustrated for a lot of it*" can be said to show lack of the inner value of Patience which led to the wishful thinking like in the phrase "*if someone had allocated team roles"* which showed the lack of Acceptance of other's views. The importance of the scoping of roles is important because teamwork during DfSI project does not have a set path and needs to be flexible according to the social innovation project it is applied on. Thus, the lack of these inner values refutes the effectiveness of teamwork during DfSI project applied in team A. Thus, the inner values observed in the quote can be said to be {-P-A }, visualised as:



The participant further adds,

> "*I think in a smaller team there's less need for real leadership. In a big team you need someone strong to take it forward, or a couple of strong individuals to really say, "This is what we're doing" otherwise everyone just argues and melees around and doesn't really do a lot. So in a smaller team, like if you looked at Name's Unilever project, really small team, very early on they just got on with it and they all knew, just knew, what their roles were, and so there wasn't a specific leader, they all were doing it, which I would have liked. But I think in a bigger team it's harder for that scenario to happen. I mean, I'd say four is probably a good team size and I think when you get up to six, five, six, seven, it starts to skew the dynamic of the team a little bit - at this level, at our level that we are at, at Master's level...I think maybe in professional level you'd have bigger teams. I've worked in consultancies; it works. Because of the financial drivers, you have to deliver the work and there's, you know, people are specialists, real specialists. They've got experience so they can deliver, and the team almost runs itself, but in this scenario I think it was more... a bigger team was harder to manage*" [Q12.10]

Step 3.1: Thematic analysis to recognise arguments made

The participant mentions that the need for leadership is dependent on the size of the team. While a small team (less than four members according to the participant) intuitively decides its direction, a structured leadership needs to be provided by one or two members in a bigger team. The participant mentions one or two strong members (personality) are required to help decide the direction of the project with the bigger team. The argument presented in the quote can be said to be

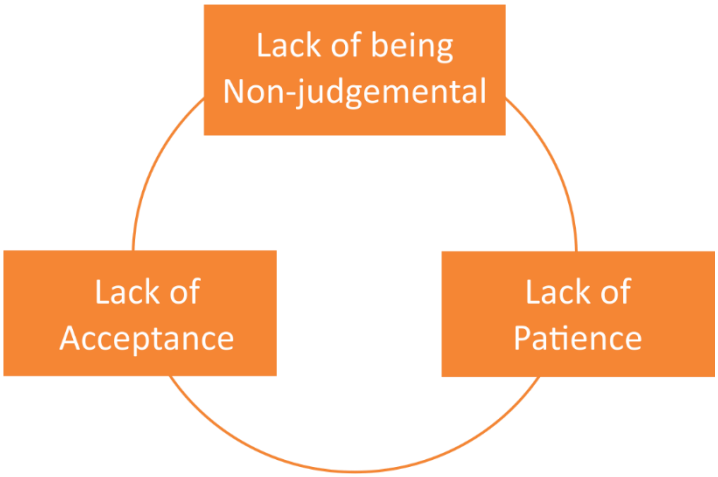
Argument 3/A-12.10: *Size of team A made it harder to manage without formal leadership*

The quote does not refute the effective teamwork during DfSI project completely; it provides evidence of difficulty in managing the team without formally assigned leadership. The participant talks about different stages of the project which, as explained by Valkenburg and Dorst (1998) can be categorised into 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mentions that in a large team, "*everyone just argues and melees around*". Even if this may be true, it can be said to show lack of inner value of being Non-judgemental by the participant which he brings to the team. Further the participant mentions "*in this scenario I think it was more, a bigger team was harder to manage*" which can be said to show lack of Acceptance. Thus, the above quotes can be said to show that lack of the inner value of being Non-judgemental leads to the lack of Patience and lack of Acceptance of

other's views. Thus, the inner values observed in the quote can be said to be {-N-P-A }, visualised as:



Step 4: Finding meaning in language for Subsection 3/A

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

The data can be said to show that though many decisions regarding project planning were made by one of the members of the team (See Argument 3/A-1.22: *Leadership was shared but one member was considered primary and another secondary*), all members were involved in discussing and decision making process (See Argument 3/A-1.24: *Though one member took lead, others shared decision making process and leadership during the DfSI project*). The execution of the plan was based on strengths of individual members even though initial planning was done by one of the members of the team (See Argument 3/A-3.17 and Argument 3/A-1.24: *One of the members made the project plan and others agreed to and contributed to it*). Thus, it can be said that the meta-argument arising from the data is *Though one member took lead, others shared leadership and decision making process during the teamwork during DfSI project*

The team explains how representing the team in front of community motivated the team member and helped to perform better (See Argument 3/A-12.20). There is no other arguments which can be merged so the meta argument can be said to be *Being the representative of the team was a motivating factor.*

The team members moved towards action and then came back to reflect, when the team could not reach consensus. Meditation helped the team stay calm and be aware of own choice to put the tasks and the team before own ego (See Argument 3/A-10.4: *The team chose action and*

reflection instead of prolonged discussion to build consensus and meditation helped to calmly go through the process.) The argument cannot be merged with other argument and so it is carried as meta-argument.

The switching of roles as leader and supporter within the teams has been depicted as a struggle because both the task are important, the team experiences distress and anxiety during both roles and also while switching between the roles. Meditation helped to maintain focus while in a role and calmly switch from one role to another (See Argument 3/A-12.29.1: *Meditation helped team members to switch calmly between the leading and the supporting positions helping teamwork during DfSI project*.) Again this argument is carried as meta argument because it cannot be merged with other arguments arising from data.

The enthusiasm and inclusiveness required during teamwork for DfSI project is important. Meditation practice helped the team "*come at it with fresh eyes*". This provided enthusiasm. However, as the day progressed, this enthusiasm decreases due to day to day activities and work load (See Argument 3/A-12.29.2: *meditation helped the members come at teamwork during DfSI project work with fresh eyes.*) Again this argument is carried as meta argument because it cannot be merged with other arguments arising from data.

The size of the team was large enough that roles and responsibilities had to be formally assigned according to the data (See Argument 3/A-12.10: *Size of team A made it harder to manage without formal leadership*). However, because no formal leader was assigned the team required added time and effort to manage themselves along with the project (See Argument 3/A-12.6: *Extra time and efforts were required by members to scope out their roles within the team due to lack of formal leadership*). Thus, the meta argument arising from the data can be said to be *Lack of formal leadership leads to difficulty in scoping of roles and extra time and effort which affects teamwork during DfSI project adversely.*

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: *Though one member took lead, others shared leadership and decision making process during the teamwork during DfSI project*

Evidentiary quote: Q1.22, Q1.24, Q3.17

Brief summary of findings from thematic analysis: The team shared the responsibility of leadership but let one member take over and supported him to make plan which according to the team was implemented by everyone in successful teamwork.

Inner value observed in the data: being Non-judgmental (Q1.22, Q1.24, Q3.17), inner value of Generosity of spirit (Q1.22, Q1.24) and the inner value of Acceptance (Q1.22, Q1.24).

Evidence: The explanation of sharing leadership within team A was explained without presumption of fair or unfair, good or bad and therefore, when the proposed model of inner values was applied, it was said that team A may have been non-judgemental with regard to leadership during their teamwork. The team members explain that the plan was made by one member but discussed and agreed upon by others and everyone contributed and their contribution was part of the plan. Such action during teamwork can be said to be non-judgemental and the observation made after applying proposed model of inner values can be said to be confirmed. The ability to accept a secondary position while planning can be said to confirm the observation of generosity of spirit within team A. The evolving plan and ability of team to contribute where possible and abide to the plan when necessary can be said to confirm the observation of the inner value of acceptance of situation.

Findings: The inner value of being Non-judgmental (Q1.22, Q1.24, Q3.17), inner value of Generosity of spirit (Q1.22, Q1.24) and the inner value of Acceptance (Q1.22, Q1.24) have been correctly observed as the inner values of the team A.

Meta-Argument 2: *Being the representative of the team was a motivating factor*

Evidentiary quote: Q12.20

Brief summary of findings from thematic analysis: When no one in the team wanted to take outright leadership, one of the members stepped up and this was motivating for him.

Inner value observed in the data: Generosity of spirit, Acceptance and Hopefulness for co-operation

Evidence: The participant took up responsibility which was necessary for the team and this confirms the observation of generosity of spirit and acceptance of situation which were made by applying the proposed model of inner values. The member became motivated due to support from the team and this can be said to confirm that the team may have had inner value of hopefulness for co-operation.

Findings: Hopefulness (Q12.20) Acceptance (Q12.20) and Generosity of spirit (Q12.20) are weak observations in the evidence as inner values of the team.

Meta-Argument 3: *The team chose action and reflection instead of prolonged discussion to build consensus and meditation helped to calmly go through the process*

Evidentiary quote: Q10.4

Brief summary of findings from thematic analysis: When situations were tough, the team members opted to compromise in a productive manner.

Inner value observed in the data: Generosity of spirit (Q10.4) and Patience (Q10.4)

Evidence: The members of team A took up extra work load to become more productive as a team and conducted tasks which they usually would not have, for the better functioning of the team. These can therefore be said to show the inner value of generosity of spirit and patience and confirm the observations made from applying the proposed model of inner values.

Findings: The inner value of Generosity of spirit and Patience are inner values of the team as is evident from the quote (Q10.4).

Meta-Argument 4: *Meditation helped team members to switch calmly between the leading and the supporting positions helping teamwork during DfSI project*

Evidentiary quote: Q12.29.1

Brief summary of findings from thematic analysis: Switching mindsets and focusing on task at hand were difficult but made possible due to regular meditative practice by the members of the team.

Inner value observed in the data: Generosity of spirit and Acceptance (Q12.29.1)

Evidence: The team members explain how the leadership was shared and members would take position of a follower when required though this was difficult. The ability to let go can be described as generosity of spirit and the wisdom to accept situation and circumstances when need arose. These inner values can therefore be said to be appropriately identified by applying the proposed model of inner values.

Findings: The inner value of Generosity of spirit and Acceptance are valid observation for the team (Q12.29.1).

Meta-Argument 5: *Meditation helped the members come at teamwork during DfSI project work with fresh eyes*

Evidentiary quote: Q12.29.2

Brief summary of findings from thematic analysis: The motivation and open mind required during DfSI was achieved by members of team A due to regular practice of AbMT.

Inner value observed in the data: Beginner's mind and Patience leading to inner value of Acceptance

Evidence: The team member explained how they could let go their prior ideas and though it was difficult, could try to bring a fresh perspective to the DfSI project everyday. These can be said to be inner values of beginner's mind that team members patiently and consistently brought to the project. Thus, the observation from applying proposed model of inner values can be said to be appropriate in this regard.

Findings: The inner value of Beginner's mind and Acceptance are weak observations of inner value for the team as is evident from the quote (Q12.29.2).

Meta-Argument 6: *Lack of formal leadership lead to difficulty in scoping of roles and extra time and effort which affects teamwork during DfSI project adversely*

Evidentiary quote: Q12.6 and Q12.10

Brief summary of findings from thematic analysis:

Inner value observed in the data: Lack of Patience and lack of Acceptance

Evidence: The survey with expert design practitioner revealed that scoping of roles is difficult in teamwork during DfSI project because every project is unique. Therefore, having a formal hierarchy or assigned roles can become counterproductive to teamwork during DfSI project because it creates unequal status between team members during the DfSI project. Breaking the hierarchy between stakeholders, users and designers is the very difference between teamwork during DfSI project and Scandinavian participatory design. Further, the quote revealed a hypothetical situation for effective teamwork during DfSI project which cannot aid the picture of inner values of the team.

Findings: The inner values of lack of Patience and lack of Acceptance cannot be considered as valid inner values for the team.

Summarization of Findings and observation for subsection 3/A

Thematic analysis

The data can be said to show that though many decisions regarding project planning were made by one of the members of the team (See Argument 3/A-1.22: *Leadership was shared but one member was considered primary and another secondary*), all members were involved in discussing and decision making process (See Argument 3/A-1.24: *Though one member took lead, others shared decision making process and leadership during the DfSI project*). The execution of the plan was based on strengths of individual members even though initial

planning was done by one of the members of the team (See Argument 3/A-3.17 and Argument 3/A-1.24: *One of the members made the project plan and others agreed to and contributed to it*). Thus, it can be said that the meta-argument arising from the data is *Though one member took lead, others shared leadership and decision making process during the teamwork during DfSI project*

The team explains how representing the team in front of community motivated the team member and helped to perform better (See Argument 3/A-12.20). There is no other arguments which can be merged so the meta argument can be said to be *Being the representative of the team was a motivating factor.*

The team members moved towards action and then came back to reflect, when the team could not reach consensus. Meditation helped the team stay calm and be aware of own choice to put the tasks and the team before own ego (See Argument 3/A-10.4: *The team chose action and reflection instead of prolonged discussion to build consensus and meditation helped to calmly go through the process.*) The argument cannot be merged with other argument and so it is carried as meta-argument.

The switching of roles as leader and supporter within the teams has been depicted as a struggle because both the task are important, the team experiences distress and anxiety during both roles and also while switching between the roles. Meditation helped to maintain focus while in a role and calmly switch from one role to another (See Argument 3/A-12.29.1: *Meditation helped team members to switch calmly between the leading and the supporting positions helping teamwork during DfSI project*.) Again this argument is carried as meta argument because it cannot be merged with other arguments arising from data.

The enthusiasm and inclusiveness required during teamwork for DfSI project is important. Meditation practice helped the team "*come at it with fresh eyes*". This provided enthusiasm. However, as the day progressed, this enthusiasm decreases due to day to day activities and work load (See Argument 3/A-12.29.2: *meditation helped the members come at teamwork during DfSI project work with fresh eyes.*) Again this argument is carried as meta argument because it cannot be merged with other arguments arising from data.

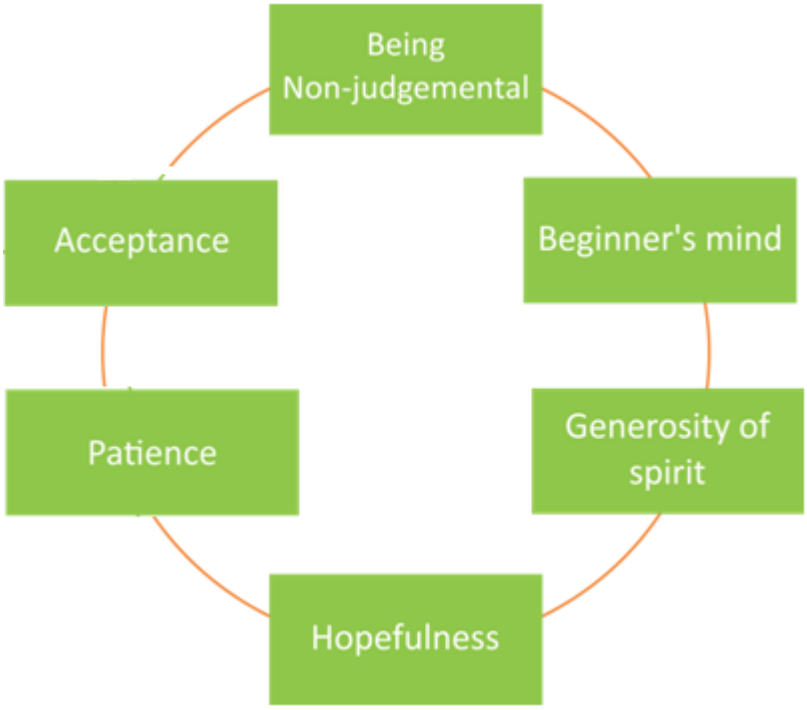
The size of the team was large enough that roles and responsibilities had to be formally assigned according to the data (See Argument 3/A-12.10: *Size of team A made it harder to manage without formal leadership*). However, because no formal leader was assigned the team required added time and effort to manage themselves along with the project (See Argument 3/A-12.6: *Extra time and efforts were required by members to scope out their roles within the team due to lack of formal leadership*). Thus, the meta argument arising from the

data can be said to be *Lack of formal leadership leads to difficulty in scoping of roles and extra time and effort which affects teamwork during DfSI project adversely.*

Inner values

Team A can be said to have a non-judgemental attitude towards leadership because they accepted a secondary role where necessary. Sharing of responsibilities which are perceived as leadership of team can be said to show generosity of spirit (Q1.22, Q12.20, Q 10.4, 12.29.1) and hopefulness for co-operation (Q12.20). When the participants decided to apply action-reflection cycle instead of prolonged discussions, the team members can be said to have demonstrated patience (Q10.4, Q12.29.2) and acceptance of situation (Q1.24, Q12.29.1, Q12.29.2). Thus, the inner values pertaining to leadership confirmed for team A are as being Non-judgmental (Q1.22) and having Generosity of spirit (Q1.22, Q12.20, Q 10.4, 12.29.1), Beginner's mind (Q12.29.2), Hopefulness for co-operation (Q12.20), Patience (Q10.4, Q12.29.2) and Acceptance (Q1.24, Q12.29.1, Q12.29.2), visualised as:

Figure 13: Inner values of team A with regard to leadership within the team for effective teamwork during DfSI project



Reflection

The reflections from members of team A can be said to provide valuable insight into the role of meditation on the activities perceived to be leadership for team work during the DfSI

project. The arguments provided on meditation creating positive effect on team work during DfSI project, refer to every type of activities, which as explained by Valkenburg and Dorst (1998), can be categorised into ‘naming’, ‘framing’, ‘moving’ and ‘reflecting’ activities. Thus, it can be said that the team work during DfSI project by team A can be said to have evolved due to AbMT intervention because members of the team believe meditation helped to resolve disagreements cordially and practically, helped to manage personal responsibilities calmly and helped team members in effort to keep an open mind.

1.3.2 Analysis of team B

Step 3: Making Observation for Subsection 3/B

Participant 11 mentions,

> "*I had planned for myself and I stuck to it and I let everyone know the progress we were making. You know keeping everyone informed and taking opinions on board and all that. But somehow, the discussions always turned sour. It was crap.*"[Q11.23]

Step 3.1: Thematic analysis to recognise arguments made

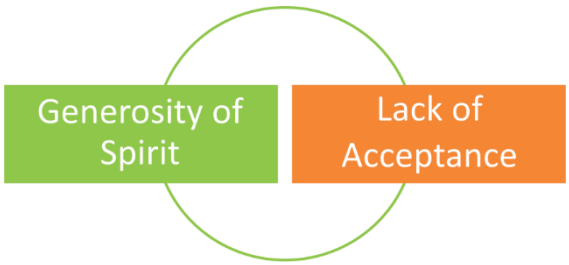
The participant explains that he took initiative, planned own activities and tried to update and involve other members but discussion turned to conflicts. Thus, the argument can be said to be

Argument 3/B-11.23: Some members took initiative, planned own activities and tried to update and involve other members but discussion turned to conflicts

The participant is talking about planning which, as explained by Valkenburg and Dorst (1998), is 'framing' activity.

Step 3.2: Applying model of inner values

The participant provides details of leading the team by "*keeping everyone involved*" and by "*taking opinions on board*". The participant can be said to show Generosity of spirit through these phrases. However, the participant mentions that "*discussions always turned sour".* This led to the participant say "*It was crap*" which can be said to show the lack of inner value of Acceptance of other's views. The Generosity of spirit in leadership is thus mentioned to be important. However, when met with defection the team member can be said to show lack of Acceptance of other's views. Thus, the inner values observed in the quote can be said to be {+G-A }, visualised as::



Participant 2 mentions,

> "*I think like the two designers in this team it almost felt like they were trying to take leadership roles when it wasn't even necessary. Like they tick a box on their CV saying, "Oh yeah, I've led a team or something", and I felt it's just wasting time to be honest. Yes, it slowed my work down.*" [Q2.5]

Step 3.1: Thematic analysis to recognise arguments made

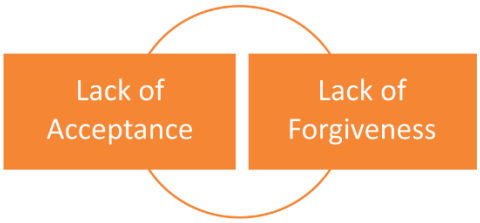
The participant explains how some team members perceived leadership as dictating tasks to other members of the team. Such leadership was unacceptable to other members and became a cause for inter-personal problems. Thus, the argument can be said to be

Argument 3/B-2.5: how some team members perceived leadership as dictating tasks to other members of the team which was not acceptable to others.

The participant seems to explain the entire project. Thus, using explanation by Valkenburg and Dorst (1998), the argument refers to 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mention, "*I felt it's just wasting time to be honest*" which can be said to show lack of Acceptance. Indeed, dictated leadership is not helpful for teamwork during DfSI project because it hampers exchange of views. The repeating negative phrases "*I felt it's just wasting time*" and "*it slowed my work down*" show the participant lacks the inner value of Forgiveness Thus, the inner values observed in the quote can be said to be {-A-F}, visualised as:



The participant further mentions

> "*I mean it's ridiculous. At the end of the day the thing with me is I work better in a team where you all come to a unanimous agreement, and you all talk about it. Not, I cannot stand it when one person, or two people from a team decide that, "I'm just going to tell people what to do", or, "I'm going to be the director of this whole teamwork. You all need to sit down and talk about it and make sure everyone's on the same level, and make sure everyone's contributing, and make sure everyone knows what's going on in the project; rather than just take it on yourself and then go away*

and then come back and expect everyone to do exactly what you want to do. I cannot, I can't work in teams like that" [Q2.6]

Step 3.1: Thematic analysis to recognise arguments made

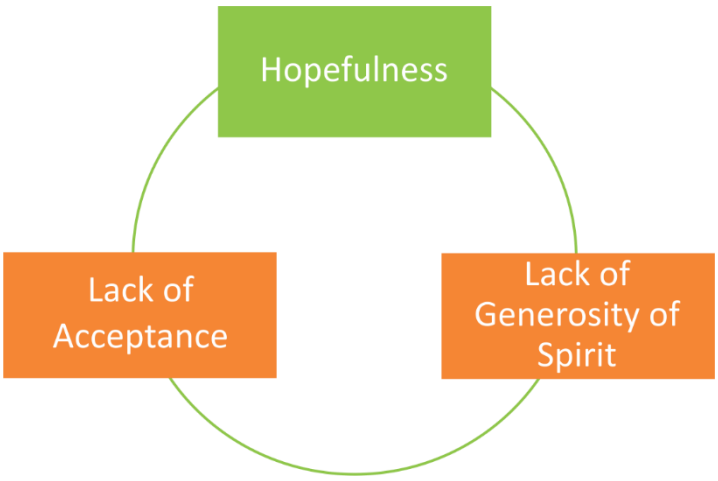
The participant explains domineering leadership style by some members of the team. The participant also re-iterates how unacceptable she finds such leadership. Thus, the argument that arises can be said to be

Argument 3/B-2.6: Some members tried leading by dictating the activities and tasks, which to other members of the team was unacceptable.

The participant seems to explain the entire project. Thus, using explanation by Valkenburg and Dorst (1998), the argument refers to 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mentions positive remarks "*make sure everyone's contributing*" and "*make sure everyone knows what's going on*". These show Hopefulness for co-operation. However, the participant also says, "*I work better in a team where you all come to a unanimous agreement*". This leads the participant to use sentence which begin with "*I cannot stand it when...*" which show lack of Generosity of spirit and use of phrases such as "*I mean it's ridiculous*" which can be said to show lack of the inner value of Acceptance. The phrases "*I cannot, I can't work in teams like that*" again show lack of Acceptance. Thus, the inner values observed in the quote can be said to be {+H-G-A-P}, visualised as:



The participant later mentions,

"*So it, like at the end of the day two of them didn't really know exactly what the project was about. But if we had done what I suggested, like say, "Oh yeah, we need to sit down and talk about this thing. We need to talk about this thing", then everyone would be on the same platform, even if they didn't, they couldn't contribute much, they'd know exactly what's going on. But I felt like that didn't really happen because a few team members thought they knew everything, and they were like, "Oh yeah, there's no time". Don't say, "There's no time, because it's not your project; it's all our project", so if there's no time then we should all be saying, "There's no time", rather than just one person deciding there's no time, so yes*"[Q2.21]

Step 3.1: Thematic analysis to recognise arguments made

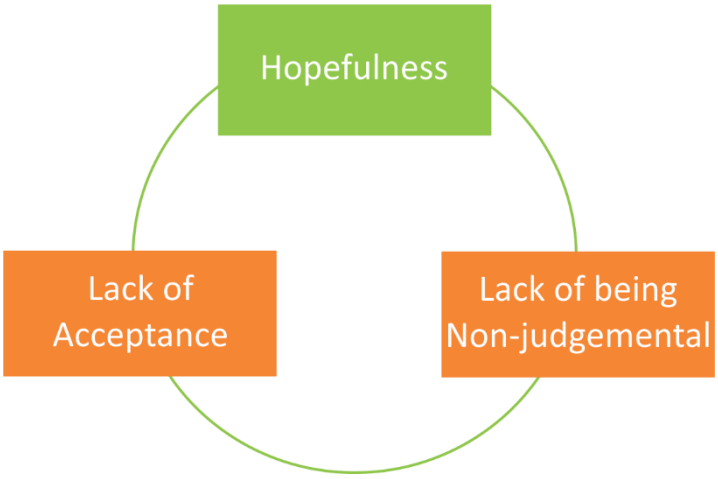
According to the participant vision of project was not shared which affected contributions by team members during the teamwork during DfSI project because leadership was not shared and everyone was not allowed access to information. The argument arising can be said to be

Argument 3/B-2.21: some team members perceived leadership as dictating tasks to other members of the team which was not acceptable to others.

The participant seems to explain the entire project. Thus, using explanation by Valkenburg and Dorst (1998), the argument refers to 'naming', 'framing', 'moving' activities. The participant cannot be specifically said to be mentioning any reflecting activities during teamwork.

Step 3.2: Applying model of inner values

The participant mentions "*We need to talk about this thing*" which can be said to show Hopefulness for co-operation. But when that did not happen, the participant says, "*a few team members thought they knew everything*" which can be said to show the lack of inner value of being Non-judgemental. This leads to the nest phrase "*if we had done what I suggested*" which is the wishful thinking of the participant and can be said to show lack of the inner value of Acceptance of other's views in team B. Because the views of the participant were not accepted, it leads the participant to make the judgement that "*a few team members thought they knew everything*". Therefore, the reflection can be said to show that lack of the inner value of Acceptance leads to lack of the inner value of being Non-judgemental. Thus, the inner values observed in the quote can be said to be {+H-N-A}, visualised as:



Participant 6 mentioned that,

> "*Really stressed, and basically I felt like if I wasn't telling people what to do, then I felt like the visualisation and the design stuff wasn't getting done. Like, I felt like I was responsible - I don't know why, because I shouldn't have been responsible for that. The planning, the leadership, dividing tasks getting things done... Yeah, it felt like it was a lot of responsibility that ... I don't know, just forced upon me, instead of me stepping up for it... Yeah. 'Cause I didn't really plan ... because I'm, like, other members of the team said, "Oh, I'm good at planning!", "I'm good at time management!" So it was up to them to do the plan, sort of thing*"[Q6.20.]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains how she had to take charge and lead because of the lack of enthusiasm in the team. The argument can be said to be

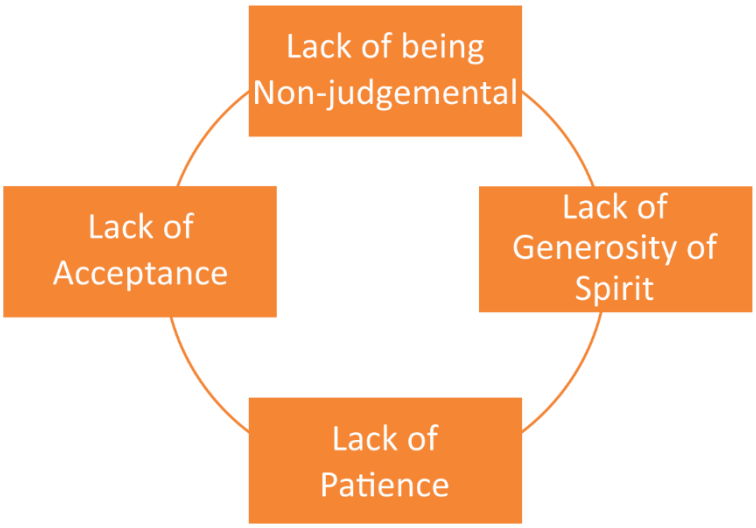
Argument 3/B-6.20: lack of planning led to uneven workload in the team which created the need for dictating tasks

The participant seems to explain the entire project. Thus, using explanation by Valkenburg and Dorst (1998), the argument refers to 'naming', 'framing', 'moving' activities. The participant cannot be specifically said to be mentioning any reflecting activities during teamwork.

Step 3.2: Applying model of inner values

The participant explains that certain people in team said "*Oh, I'm good at planning", so it was up to them to do the plan*". The participant can be said to show lack of inner value of being Non-judgemental because of the sarcastic remark. The participant then felt that "*responsibility forced upon me, instead of me stepping up for it*" which can be said to show

lack of Generosity. This was followed by the participant "*basically I felt like if I wasn't telling people what to do, then... stuff wasn't getting done*" which can be said to show the participant had lack of Patience. This led to the lack of Acceptance of other's views which is seen in participant's remark that she felt "*Really stressed*". Thus, the inner values observed in the quote can be said to be {-N-G-P-A}, visualised as:



Participant 11 mentions that

> "*I knew from start this was going to be tough. think within a team of same discipline people it would have been more of a collaborative approach, whereas in this team I felt like I was the leader and taking lead a lot of the times, and I don't like doing that. I felt I had to lead, because other people were not as efficient or capable, I guess. Not that they didn't want to, sometimes they were being lazy i guess, including myself, but sometimes they just couldn't. I couldn't wait around. So I had to tell them how to approach or sometimes, even what to do. I later found out certain people thought, they thought, I was dictating the tasks.*" [11.2]

Step 3.1: Thematic analysis to recognise arguments made

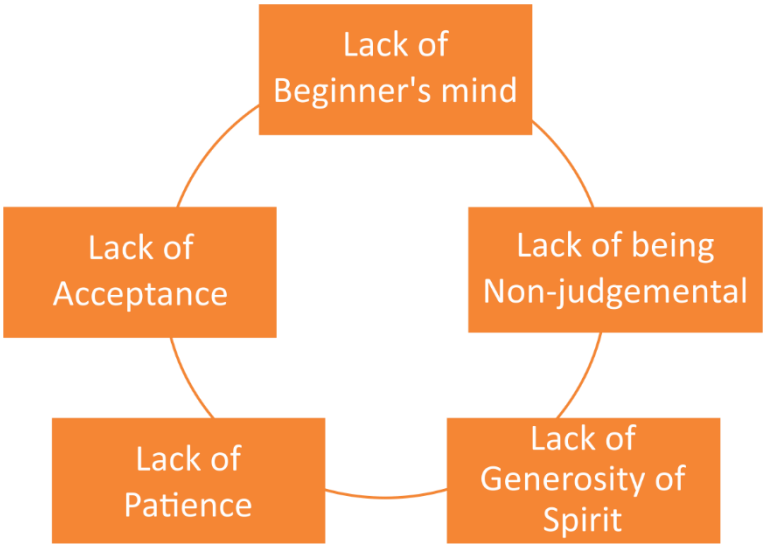
The participant questions knowledge and ability of his team members and explains this as reason for him taking lead during the DfSI project. The argument can be said to be

Argument 3/B-11.2: inability to perform certain tasks, led to the need to guide other team members by assigning and explaining tasks

The participant seems to explain the entire project. Thus, using explanation by Valkenburg and Dorst (1998), the argument refers to 'naming', 'framing', 'moving' activities. The participant cannot be specifically said to be mentioning any reflecting activities during teamwork.

Step 3.2: Applying model of inner values

The participant mentions that "*I knew from start this was going to be tough*" which can be said to show lack of Beginner's mind. Further, the participant mentions "*people were not efficient or capable*". By making generalizations about "*people*", the participant can be said to show the lack of the inner value of Non-judgemental being. The participant mentions "*I couldn't wait around*" which can be said to show lack of Patience. The participant says he had to "*tell them how to approach or sometimes, even what to do*". This can be said to show Generosity of spirit because the participant put extra efforts for betterment of team. Indeed, sometimes team members have to guide other team members or stakeholders through the teamwork during DfSI project. However, the quote can be said to show the importance of the inner value of Non-judgemental being. Otherwise, the Generosity of spirit is misunderstood which is what happened with the participant. It led to lack of Acceptance of his views by his team. Thus, the inner values observed in the quote can be said to be {-B-N+G-P-A }, visualised as:



Step 4: Finding meaning in language for Subsection 3/B

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

The data showed that self reliance rather than teamwork happened within team B (Argument 3/B-11.23: Some members took initiative, planned own activities and tried to update and involve other members but discussion turned to conflicts). Other quotes do not explain the self reliance part of the argument and this argument needs to be carried as meta argument on its own merit as Meta-Argument 1: *Some members took initiative, planned own activities and tried to update and involve other members but discussion turned to conflicts*.

The data can be said to show that leadership was not shared within team B and was taken up by few members of the team (see argument 3/B-2.5, Argument 3/B-2.6, Argument 3/B-2.21: some team members perceived leadership as dictating tasks to other members of the team which was not acceptable to others). This was considered counterproductive as it repressed members who could not lead. Thus, the meta argument arising from such data can be said to be: *The leadership of the team dictated the activities and tasks to other members of the team which was counterproductive for the teamwork during DfSI project team.*

The data reveals that when members of the team did not step up to plan and execute the project, the leadership and day to day tasks became unevenly distributed (See argument 3/B-6.20: lack of planning led to uneven workload in the team which created the need for dictating tasks and argument 3/B-11.2: inability to perform certain tasks, led to the need to guide other team members by assigning and explaining tasks) Thus the meta argument from such arguments can be said to be *Lack of leadership and planning led to uneven workload and affected teamwork during DfSI project adversely*

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: Some members took initiative, planned own activities and tried to update and involve other members but discussion turned to conflicts

Evidentiary quote: Q11.23

Brief summary of findings from thematic analysis: Self reliance rather than teamwork took place during the DfSI project.

Inner value observed in the data: Generosity of spirit (Q11.23) and lack of the inner value of Acceptance (Q11.23)

Evidence: The participant explains that lack of participation from team members led to the participant planning for his own tasks and communicated such plan to the team. The team tried to involve others in the planning and execution process which can be said to be generosity of spirit which can be said to be brought by one team member which may have affected the teamwork during DfSI project. However, the lack of participation seems to become hurdle to teamwork and this can be said to reveal lack of acceptance of situation which needs to be changed. The expert design practitioners reveal in the supporting study that accepting situations that require changing is wisdom that DfSI team members need to show which is not apparent in the data. Thus, the observation of generosity of spirit and lack of acceptance observed by applying the proposed model of

inner values can be considered appropriate inner values of the team during the DfSI project.

Findings: Generosity of spirit (Q11.23) and lack of the inner value of Acceptance (Q11.23) can be considered the inner values of the team.

Meta-Argument 2: The leadership of the team dictated the activities and tasks to other members of the team which was counterproductive for the teamwork during DfSI project.

Evidentiary quote: Q2.5, Q2.6, Q2.21

Brief summary of findings from thematic analysis: The dictating type of leadership was considered unacceptable and hindrance during teamwork for the DfSI project.

Inner value observed in the data: Hopefulness for co-operation (Q2.6, Q2.21), lack of inner value of being Non-judgemental (Q2.21), lack of Generosity (Q2.6), lack of the inner value of Acceptance (Q2.5, Q2.6, Q2.21) and lack of Forgiveness (Q2.5)

Evidence: The need for everyone contributing to project planning and leading execution of plan can be said to show hopefulness for co-operation, confirming the observation made by applying the proposed model of inner values. However, the team members did not share leadership and some members considered themselves to be better at managing project than others. Such attitude can be said to be judgemental and lacking generosity. This was not acceptable to other members of the team which led to inter-personal differences and adversely affected teamwork during DfSI project. This can be said to show lack of acceptance and lack of forgiveness. The inner values observed by applying the proposed model can be said to be appropriate observations

Findings: Hopefulness for co-operation (Q2.6, Q2.21), lack of inner value of being Non-judgemental (Q2.21), lack of the inner value of Acceptance (Q2.5, Q2.6, Q2.21), lack of Forgiveness (Q2.5) and lack of Generosity (Q2.6) can be considered as the inner values for the team.

Meta-Argument 3: Lack of leadership and planning led to uneven workload and affected teamwork during DfSI project adversely

Evidentiary quote: Q6.20, Q11.2

Brief summary of findings from thematic analysis: When initiative was not taken by team members, certain members had to take up leadership of team and take decisions such as planning and executing the DfSI project which was an added workload. Many reasons for such lack of initiative have been explained.

Inner value observed in the data: Generosity of spirit (Q11.2, Q6.20), lack of Beginner's mind (Q11.2), lack of being Non-judgemental (Q6.20, Q11.2), lack of inner value of Acceptance (Q6.20, Q11.2) and lack of Patience (Q6.20, Q11.2).

Evidence: Team members explain that they took added workload to lead the team when no one stepped up which can be considered to be generosity of spirit. But the reasons explained for members not stepping up reveal judgemental attitude. The uneven workload was not acceptable and when team members tried to reallocate the tasks, they had to enforce the decision to make progress which can be said to be lack of patience. Therefore, the inner values observed by applying the proposed model can be considered appropriate.

Findings: Lack of being Non-judgemental (Q6.20, Q11.2), lack of inner value of Acceptance (Q6.20, Q11.2) and lack of Patience (Q6.20, Q11.2) are strong observations and Generosity of spirit (Q11.2, Q6.20) and lack of Beginner's mind (Q11.2) are weak observations as inner values for the team.

Summarization of Findings and observation for subsection 3/B

Thematic analysis

Meta-Argument 1: Certain members took initiative, planned own activities and tried to update and involve other members (Q11.23). However, the discussion turned into arguments which were counterproductive.

Certain members of team B took the initiative in planning their own activities and tried to update and involve other members of their team in planning activities for the team. However, the discussions during planning turned into counterproductive arguments (See argument 3/B-11.23). Some team members thought it necessary to provide leadership by assigning tasks and roles to other members of the team (See arguments argument 3/B-6.20 and argument 3/B-11.2).

Meta-Argument 2: The leadership of the team dictated the activities and tasks to other members of the team (Q2.5, Q2.6, Q2.21) which was counterproductive for the teamwork during DfSI project team.

The assigning tasks and roles was perceived by the other members of the team as dictating rather than discussing responsibilities during teamwork (See argument 3/B-2.5, argument 3/B-2.6 and argument 3/B-2.21).

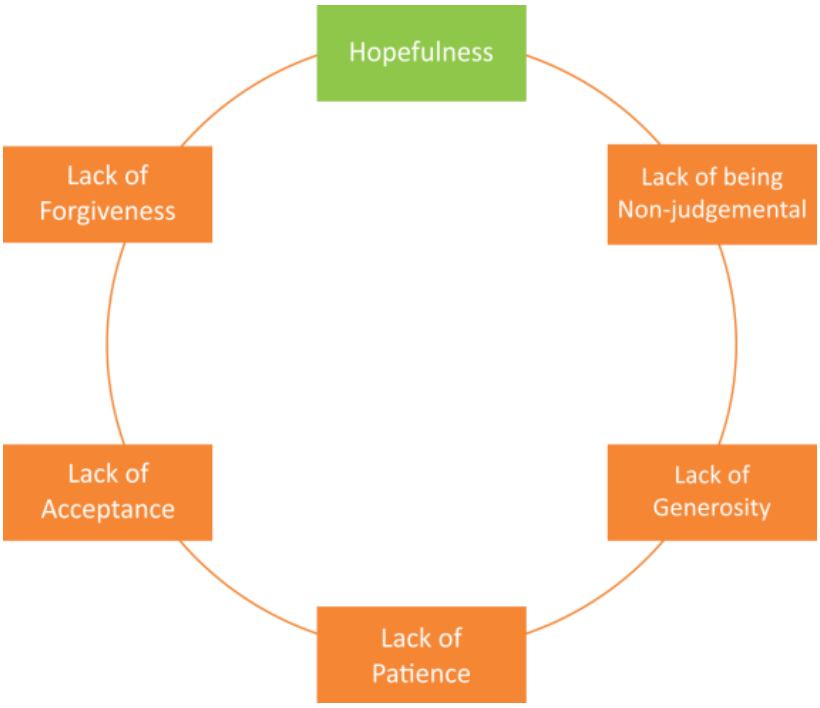
Meta-Argument 3: Lack of leadership and planning led to uneven workload and affected teamwork during DfSI project adversely (Q6.20, Q11.2).

The members recognized that a lack of leadership and planning within team B led to an uneven workload between team members and prolonged discussions and inter-personal problems, which adversely affected their teamwork during the project (See argument 3/B-6.20 and argument 3/B-11.2).

Inner values

Team B lacked, ‘hopefulness for co-operation’ (Q2.21, Q2.6) and the inner value of, ‘patience’ (Q11.2, Q6.20) when the team members did not share leadership effectively and instead dictated roles and responsibilities to each other. The members were, ‘judgemental’ (Q11.2, Q6.20, Q2.21, Q11.23), lacking, ‘forgiveness’ (Q2.5) and ‘acceptance of the situation’ (Q11.2, Q6.20, Q2.5, Q2.21 andQ11.23) during decision making perceived as leadership during teamwork. This is visualised as

Figure 14: Inner values of team B with regard to leadership within the team for effective teamwork during DfSI project



Reflection

the members of team B agree that leadership in the team was not shared and tasks had to be assigned. The participants explained that this happened throughout the project, which using Valkenburg and Dorst's (1998) explanation refers to, 'naming', 'framing', 'moving' and 'reflecting' activities during the DfSI project. While some members believe assigning roles and responsibilities was a necessity, other members found this unacceptable. The principles of leadership of Team B are unclear. What is evident is that two extreme opinions on decision-making, leadership and management for the DfSI project existed in team B. One opinion believed that roles and tasks had to be assigned to others, the other considered such leadership fiercely unacceptable. Such opposing 'frames' of reference toward project planning and management, perceived by the team as leadership, was clearly the breeding ground for resentment and conflict within team B during 'moving' activities.

1.3.3 Analysis of team C

Step 3: Making Observation for Subsection 3/C

Participant 4 mentions,

> "*I think within a team of designers it would have been more of a collaborative approach, whereas in the other team I felt like sometimes I was having to lead a lot of the time, and I don't generally like doing that. I like having everyone's input, and then sometimes leading during different stages, 'cause of what they're best at. But with this one I felt I had to lead, and I didn't really like doing that, 'cause I don't really like telling people what to do, like how they should do it... so I involved everyone and let everyone decide... but sometimes I had to decide otherwise if I didn't, nothing would have got done.*" [Q4.2]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains the need to step up to take decisions was rising and she stepped up when needed but involved everyone to make the decisions. The argument can be said to be:

Argument 3/C-4.2: leadership was taken up to support the team and to get tasks completed

The participant seems to explain the 'framing' activities of the project based on the explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant explains that leadership was required to get work done. The participant mentions stepping up to lead because of the need in the team, which can be said to show Generosity of spirit. Thus, the inner values observed in the quote can be said to be {+G}, visualised as:

Later, participant 4 mentions,

> "*I was just thinking if someone said that to me, I would have been annoyed as well, so ... Yeah, I started to think to treat others as you wish to be treated, and in that instance I probably wasn't being that nice. Because things like meditation made me think, "Oh, I wouldn't like it if someone had done that to me", but then I was also thinking, "But I wouldn't have done that. But I didn't say anything. I guess that would be progress, because it* (meditation) *stop me from doing something I don't want to do.*" [Q4.25]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains how reflection on own behaviour was possible because of meditative practice and the argument made can be said to be:

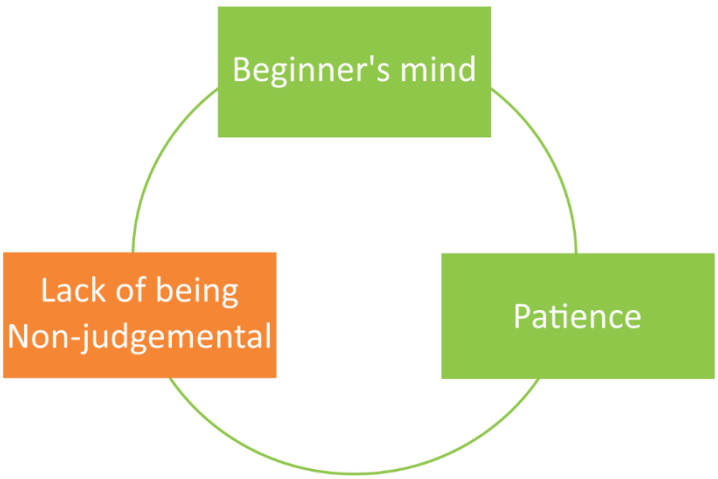
Argument 3/C-4.25: meditation helped to reflect on her own behaviour during teamwork during DfSI project

The participant seems to explain the 'reflecting' activities based on the explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant mentions meditation brought the inner value of Beginner's mind in the phrase "*I started to think*". This led to inner value of Patience seen in the phrase "*treat others as you wish to be treated*". However, the participant is still Judgemental sometimes seen in the phrase *"Iwouldn't have done that*".

The participant describes that she did not say anything to the members of her team about her thoughts because saying something judgemental was not something she wanted to do. The meditation practice created a boundary for the participant between thinking and action which helped the participant not to react by observing her own thoughts and analysing her own actions. Thus, the inner values observed in the quote can be said to be {+B+P-N}, visualised as:



Participant 7 mentions that,

> "*I think I was probably the best person in the group with time management... So I was probably, I'm the best one at time keeping, 'cause a lot of people in my group, they're like, "Oh, slept in. I'm coming in later, blah blah blah". I'm not that bothered, really,*

about other people. I know some of the other teams, some of the leaders in their team were like, "Be in at 9.00am!" I'm just like, "Well, I'm going to be in at this time. You can come in whenever you want", 'cause I don't want to be ... As much as I do boss people around, I don't want to be dictating to people what they've got to do and where they've got to be at a certain time. Come in when you want, go for your lunch when you want - do what you want. As long as the work gets done I'm not ... "Have you done that?", "Yeah.", "Okay, well have that done by the end of the day. That's it, and then do whatever you want". I'm not very, like, I don't know ... Well, I am a bit pushy. I'm not very strict. 'As long as you get this done by whenever we need it, I'll be happy. Do whatever you want, as long as you get it done."[Q7.13]

Step 3.1: Thematic analysis to recognise arguments made

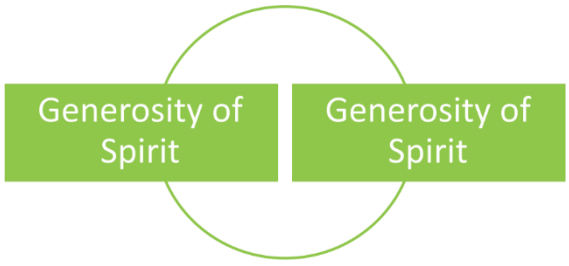
The participant explains time management of the team and can be sadi to make the argument:

Argument 3/C-7.13: Team members were focused on task rather than time and taking leadership when needed.

The participant seems to explain 'moving' activity but also the entire project. Thus, using explanation by Valkenburg and Dorst (1998), the argument refers to 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant reports being happy when work gets done but does not think of it in terms of good or bad, fair or unfair. Indeed, the participant is Non-judgemental towards herself and others in her team. This seems to help the participant with her decisions regarding time keeping or getting tasks completed from others. The participant can be said to show Generosity of spirit when she say "*Come in when you want, go for your lunch when you want - do what you want*". It reiterates in her explanation of being "*pushy but not strict*". The participant highlights the importance of the above inner values of being Non-judgemental, having Generosity of spirit and Patience helps reduce ego-centric conflict and brings focus on the task rather than on time or plan. Thus, the inner values observed in the quote can be said to be {+G+N}, visualised as:



Step 4: Finding meaning in language for Subsection 3/c

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

leadership was shared and members took the lead, as necessary, to support their team (See argument 3/C-4.2: leadership was taken up to support the team and to get tasks completed),by keeping the focus of the team on tasks and by managing time flexibly (suited to individual member) (argument 3/C-7.13: Team members were focused on task rather than time and taking leadership when needed). Thus the meta argument can be said to be *leadership was taken up to support the team and to keep focus of the team on tasks* (Q4.2, Q7.13).

During the activities perceived as leadership, the member of team C who practiced AbMT intervention explained that meditation helped her to reflect on her own behaviour and act cordially with other members of the team rather than reacting to situations (See argument 3/C-4.25: *meditation helped to reflect on her own behaviour during teamwork during DfSI project*). The argument is not presented in other quotes and used as meta-argument.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: leadership was taken up to support the team and to keep focus of the team on tasks

Evidentiary quote: Q4.2, Q7.13

Brief summary of findings from thematic analysis:

Inner value observed in the data: being Non-judgemental (Q7.13) and Generosity (Q4.2, Q7.13)

Evidence: Inner value of Generosity is required to take up extra responsibilities for the betterment of the team. Evidence can be said to show that members of the team shared responsibilities of getting work done (Q4.2, Q7.13). Thus the inner value of Generosity is a valid observation for the team in the evidence (Q4.2, Q7.13). The inner value of being Non-judgemental is required to remain unbiased and objective. Evidence can be said to show that the team did not think about the responsibility of leadership in terms of good or bad, fair or unfair (Q4.2, Q 7.13). Thus the inner value of being Non-judgemental is a valid observation for the team (Q4.2, Q7.13).

Findings: The inner value of being Non-judgemental (Q7.13) and Generosity of spirit (Q4.2, Q7.13) are recognised as the inner values of the team.

Meta-Argument 2: meditation helped to regulate behaviour which improved interactions within team and helped teamwork during DfSI project

Evidentiary quote: Q4.25

Brief summary of findings from thematic analysis:

Inner value observed in the data: Beginner's mind (Q4.25), Patience (Q4.25), lack of Being Non-judgemental (Q4.25)

Evidence: Inner value of Beginner's mind is required to keep open mind while Patience is required not to react before an event unfolds. Evidence can be said to show that member of the team could let go preconceptions and open the mind to new ideas and did not react so as to treat others in the team with respect (Q4.25). Thus the inner value of Beginner's mind and Patience were correctly observed for the member of the team. However, it cannot be determined if the inner values were present in the team. The inner value of being Non-judgemental is required to be unbiased and an objective view. Evidence can be said to show that the member had judgemental thoughts but did not express them (Q4.25). Thus the observation of lack of inner value of being Non-judgemental is invalid observation (Q4.25).

Findings: Beginner's mind (Q4.25) and Patience (Q4.25) are weak observations as the inner values of the team.

Summarization of Findings and observation for subsection 3/C

Thematic analysis

Meta Argument 1: *leadership was taken up to support the team and to keep focus of the team on tasks* (Q4.2, Q7.13).

In team C, with both meditators and non-meditators, leadership was shared and members took the lead, as necessary, to support their team (See argument 3/C-4.2: leadership was taken up to support the team and to get tasks completed),by keeping the focus of the team on tasks and by managing time flexibly (suited to individual member) (argument 3/C-7.13: Team members were focused on task rather than time and taking leadership when needed).

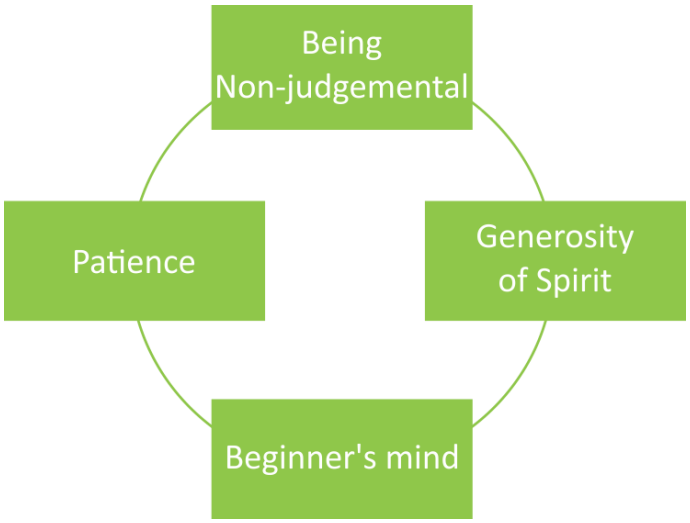
Meta Argument 2: *Meditation helped to regulate behaviour which improved interactions within team and helped teamwork during DfSI project* (Q4.25)

During the activities perceived as leadership, the member of team C who practiced AbMT intervention explained that meditation helped her to reflect on her own behaviour and act cordially with other members of the team rather than reacting to situations (See argument 3/C-4.25).

Inner values

The inner value system of the team towards the idea of leadership during teamwork is explained below. Team C members shared leadership when required, which reveals, ‘a non-judgemental attitude’ (Q7.13) and a ‘generosity of spirit’ (Q4.2, Q7.13). Meditation may have helped the practitioner member of the team to reflect on her own actions, which can be said to reveal a ‘beginner’s mind’ (Q4.25), and to act empathically with other members of the team, which can be interpreted as the inner value of, ‘patience’ (Q4.25).

Figure 15: Inner values of team C with regard to leadership within the team for effective teamwork during DfSI project



Reflection

The team members shared responsibilities of planning, decision-making and execution of tasks. Sometimes decisions needed to be made and one of the members would step up as leader to help the team make it. The team's management strategy was strict but flexible, and focused on prioritising things that were deemed important. The leadership was cordial, which may be because the member practicing AbMT intervention could reflect and modify her own behaviour and actions for better teamwork during the project. The leadership changes spanned the entire project and by using Valkenburg and Dorst's (1998) explanation of design activities, , the members can be said to refer to 'naming', 'framing', 'moving' and 'reflecting' activities when they described shared leadership by team C.

1.4 Analysis of theme 4: The effect of input from the client (sponsor) on the team work during DfSI project

Step 2: Creating Data matrix to organise data:

Participant no.	Quotes that support effective teamwork during DfSI project		Quotes that refute effective teamwork during DfSI project	
Sub-section 4/A: Team A	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	1.11 1.13 3.7 5.10. 12.12	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.1	1.10 1.12 3.8 5.9 10.11 12.11	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.1.
Sub-section 4/B: Team B			Quote Number	Where to locate in the thesis
			2.18 6.6 11.10. 11.11	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.2.
Sub-section 4/C: Team C	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	4.11 4.13 7.20 9.3	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.3.	9.4	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.4.3.

1.4.1 Analysis of team A

Step 3: Making Observation for Subsection 4/A

Participant 1 mentions,

> "*As soon as we had our second interim with them we got, well I wouldn't say it was negative feedback, we got some positive and some negative – but the negative gave us a lot of direction... And that really motivated us all. Particularly for the last two weeks because we were working to a tight deadline and we knew where we had to go. So I'd definitely say it does affect your attitude and your involvement almost.*"[Q1.11]

Step 3.1: Thematic analysis to recognise arguments made

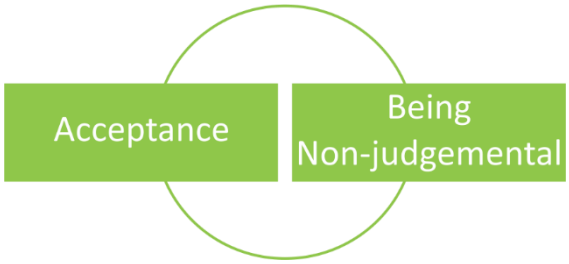
The participant explains the significance of client feedback to the DfSI project and how it changed the dynamics of their teamwork. The argument made can be said to be:

Argument 4/A-1.11: critical feedback from client gave direction to the efforts of the team and motivated the team.

The participant seems to explain reflecting and moving activities as described by the explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant showed that the team had the inner value of Acceptance of other's view when he mentions that negative feedback "*really motivated us*". The participant does not think of the negative feedback in terms of good or bad, fair or unfair. So he is said to report the event with the inner value of being Non-judgemental. This can be seen in the use of the phrase "*some positive, some negative*". The ability to accept positive and negative feedback is important in teamwork during DfSI project because it helps teamwork during DfSI project incorporate suggestions and feedbacks. Indeed, this attitude is important not only towards clients but towards all stakeholders and users involved in teamwork during DfSI project. Thus, the inner values observed in the quote can be said to be {+A+N}, visualised as:



The participant talks about delay in client feedback and provides evidence refuting effective teamwork during DfSI project in quote 1.12. This quote is discussed in the next section. The participant then continues,

> "*But the way that they explained the negative feedback they had very valid points. We'd kind of strayed away from the brief and lost our direction.*"[Q1.13]

Step 3.1: Thematic analysis to recognise arguments made

The participant makes a succinct argument as:

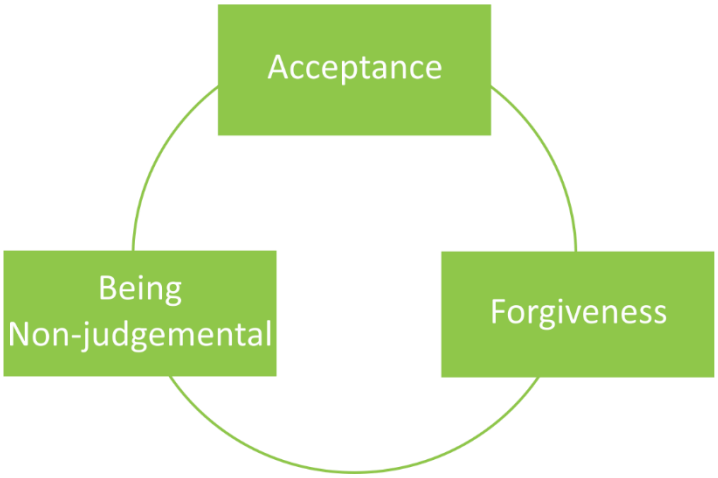
Argument 4/A-1.13: it was not just the content but the method in which the client explained the critical feedback that encouraged the team

The participant seems to explain 'naming' and also 'reflecting' activities as explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

This quote can be said to show the inner values of Acceptance ("*valid points*") and inner value of being Non-judgemental ("*We'd strayed*"). However, the quote also can be said to show the inner value of Forgiveness towards the client. This is because the participant mentions before this quote that there was delay in client feedback which affected the team negatively. The participant can be said to show the inner value of Forgiveness and explains it came because the client explained the negative feedback to demonstrate how they had strayed from their social innovation project brief.

The findings from the participant show the importance of the inner value of Acceptance and being Non-judgemental. Thus, the inner values observed in the quote can be said to be {+A+F+N}, visualised as:



Participant 3 mentions that

"*They gave us very critical feedback, which was something really good. But if they said, 'Oh it's all right but, you know, you need some changes' you know, it won't be the same. So they gave us very critical feedback, so we knew that we have to, you know, start almost from the beginning. I mean with all the knowledge that we had already, it was easier but we had to almost forget about what we've done and just start again. So, yeah, I mean it was good*"[Q3.7]

Step 3.1: Thematic analysis to recognise arguments made

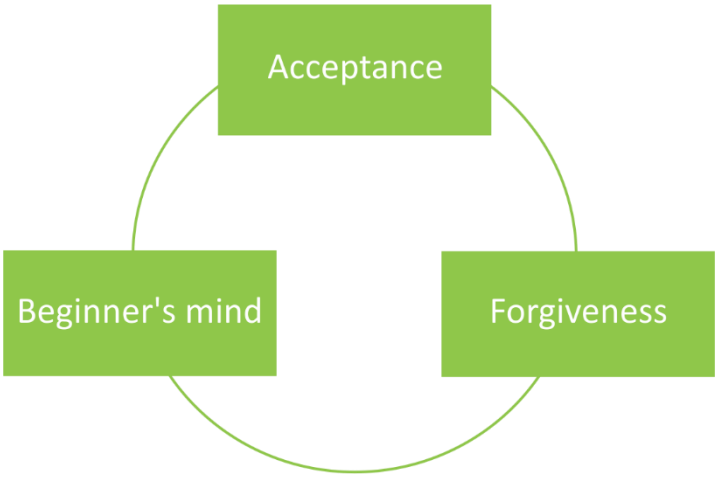
The participant explains importance of critique by the sponsors of the project and can be said to make argument that

Argument 4/A-3.7: even though the team had to start all over again, they had all the research work ready

The participant seems to explain reflecting activities as described by the explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

When speaking about the critical feedback in the sentence "*they gave us very critical feedback, so we knew that we have to (do)*" the participant can be said to show the inner value of Acceptance of other's views. This is quickly followed by the inner value of Beginner's mind seen in the phrase "*we had to almost forget about what we've done and just start again".* It can be argued here that between Acceptance and Beginner's mind, the participant can be said to show the inner value of Forgiveness because in this quote the participant can be said to show "it happens" attitude. The members in the team A forgave client for defection, which was delay in feedback, because the client explained their negative feedback providing direction to the team. The importance of these inner values is that due to inner value of Acceptance of the feedback and with the inner value of Beginner's mind while starting again, time was not wasted but utilised for teamwork during DfSI project activities. Thus, the inner values observed in the quote can be said to be {+A+F+B}, visualised as:



Participant 5 mentions that,

> "*They kind of softened it up afterwards, like, after the start when they told us that we'd completely missed the brief, and then at the end they were like, "Where's the passion again?" 'cause I remember - it was like, "Where's the passion? You kinda lost that", then I went back again, it's like, "Actually, yeah, 'cause right now I'm kind of using it as a project", so from the client I got motivated again, and then at the very end, after our interim presentation, I was actually motivated more to do about this project.*" [Q5.10]

Step 3.1: Thematic analysis to recognise arguments made

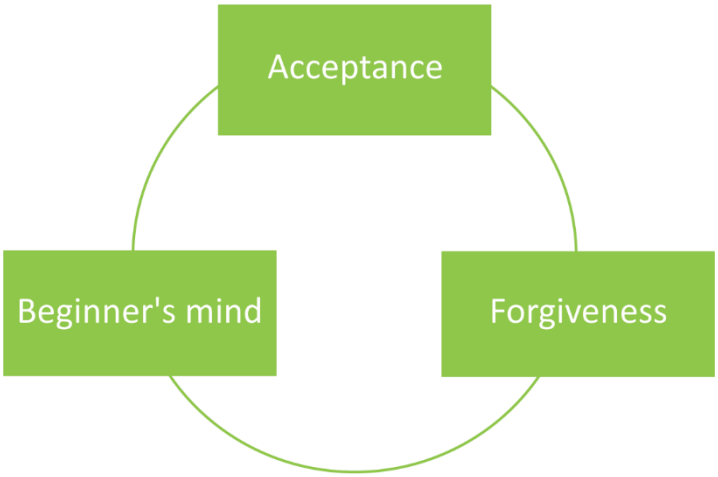
The participant explains how the sponsors motivated the team and presents argument that

Argument 4/A-5.10: the client explained how the team had missed the brief and asked the team "*where is the passion?*" which motivated the team.

The participant seems to explain 'framing' and also 'reflecting' activities as explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

In this quote, the participant can be said to show the inner value of Acceptance of the negative feedback which came after the client "*softened it up*". This was followed by the inner value of Forgiveness for the client seen in the phrase "*Actually, yeah*". The participant is said to show inner value of Beginner's mind when she lets go the pre-conception of "*using it as a project*". Thus this evidence builds up to support effective teamwork during DfSI project practice by team A. Thus, the inner values observed in the quote can be said to be {+A+F+B}, visualised as:



Participant 12 mentions,

> "*When we did have it, it (client feedback) completely changed the group dynamic, it changed the motivation level, it changed our relationship, and it made it a lot more real and a lot more, you know, there was consequences and I think it was almost like, before, people were just doing an assignment and then after people were doing a live brief. That was the feeling , which was good, so I think it was a real reality check and that made people step up and think you know, this is what's expected of us and we're not doing that at the moment, and it really made the whole team utilise their skills better... 'cause I sort of, almost before that, I just accepted this is how it was in our group, and this is the sort of thing we were going to deliver, 'cause I didn't want to fight it or battle or ... I just thought, "Okay, we'll just get it done", and then once that interim happened, I was like, "Well, actually no, this is what's expected of us. This is what we really need to do" and so it made me probably be a bit more authoritative as well, because it directly affected me and so I wanted to get it done, and I really wanted to make sure it was done, and everyone was on, so I actually became a lot more authoritative, but I think everyone reacted well to that.*" [12.12]

Step 3.1: Thematic analysis to recognise arguments made

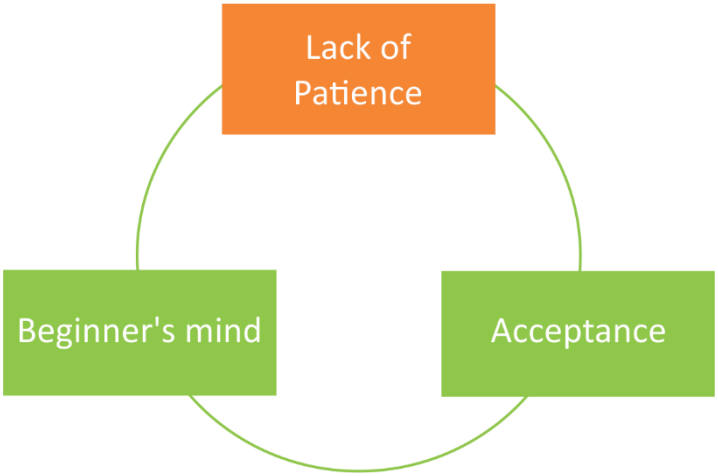
The participant explains how before the feedback from the client the team lacked focus but after the feedback the perception towards the project changed from 'assignment' to 'live brief'.

Argument 4/A-12.12: critical feedback from client was important because it gave direction and changed attitude of the group towards the project

The participant seems to explain 'framing' and also 'reflecting' activities as explanation by Valkenburg and Dorst (1998). The participant also explains the effect of such actions with client on the 'naming' and 'moving' activities. Thus, the argument can be said to be made for 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mentions the team treated the project as "*assignment"* and he had "*just accepted this is how it was in our group, and this is the sort of thing we were going to deliver".* This can be said to show the team lacked the inner value of Patience. However, after the feedback, the participant explains team were working on "*live brief*" and made the participant realise "*this is what's expected of us*". The participant reveals the inner value of Acceptance of other's view, in this case the client, by the team. The participant can be said to show the change in pre-conception "*it made it a lot more real*" which can be said to show the inner value of Beginner's mind. Thus, the inner values observed in the quote can be said to be {-P+A+B}, visualised as:



Participant 1 mentions,

> "*I've literally said to the team, "I cannot be bothered". Like everyone's done it. I think partly that was because of we had a lack of client feedback and we didn't know what direction to go in. So it almost felt like we were just going where we thought we should. So I think the client, the level of client feedback that we get really does affect the project and our attitude*" [Q1.10]

Step 3.1: Thematic analysis to recognise arguments made

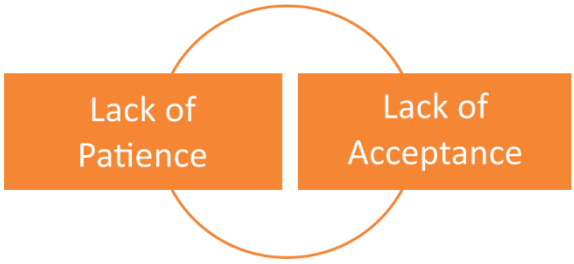
The participant explains the effect of lack of feedback on the team's morale and can be said to present the argument that

Argument 4/A-1.10: delayed feedback from client reduced enthusiasm during teamwork for DfSI project

The participant seems to explain framing' and 'reflecting' activities which determined the 'moving' activities based on the explanation by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant mentions the "*I cannot be bothered*" which can be said to show lack of Patience. The participant explains the reason for this was lack of client's feedback. The participant mentions "*felt like we were just going where we thought we should*" which can be said to show lack of the inner value of Acceptance of the delay in feedback, or in this case lack of views. Thus, the inner values observed in the quote can be said to be {-P-A}, visualised as:



The participant continues,

> "*We tried to get the client involved this semester. We set up an online blog and we were updating that daily. We emailed the links to them and they just didn't bother checking it. I don't know if they didn't feel it was worthwhile or they wanted to wait till the end. But I think if they'd checked that they'd have been able to see the direction we were going in and we could've even had a Skype call and they could have told us a lot earlier than what they did. They didn't like some of the ideas that we had and I think that would have been a better use of our time and I think we could've came up with better results for them in the end. They should've. They should've*" [Q1.12]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains how feedback from client affected their teamwork and can be said to argue that

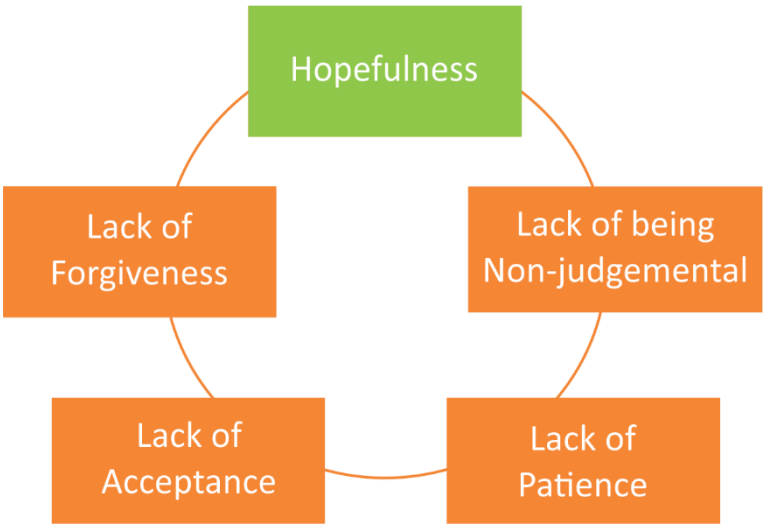
Argument 4/A-1.12: early feedback from the client could have affected the teamwork during DfSI project positively by saving time and creating better results

The participant seems to explain framing' activities along with the 'moving' activities as explained by Valkenburg and Dorst (1998). What seems to be reflecting activity can be said to be a post project reflection based on the hypothetical scenarios explained by the participant.

Step 3.2: Applying model of inner values

The participant mentions that their team "*tried to get the client involved this semester*" which can be said to show the team showed the inner value of Hopefulness. The participant mentions, "*they just didn't bother checking*". This can be said to show lack of the inner value

of being Non-judgemental. The lack of Patience mentioned above is a result of such judgements by the participant. The participant then uses the phrase "*if they'd checked that...*" which is wishful thinking which can be said to show Lack of Acceptance of other's views. The participant blames the client and repeats the phrase "*They should've.*" This can be said to show lack of the inner value of Forgiveness. The lack of forgiveness can be said to stem from the defection by client in response to their Hopefulness. These inner values affected the teamwork during DfSI project negatively. Thus, the inner values observed in the quote can be said to be {+H-N-P-A-F}, visualised as:



Participant 3 mentions,

> "*I mean just what I said before that we didn't have any communication with them. So that was, you know, like quite a bad thing. And I think we tried even to contact with someone from the company but we never got any response. And then finally when we met them, when we showed what we had got, they gave us very critical feedback, which was something really good. But it could have been much earlier. You know. They should have.*"[Q3.8]

Step 3.1: Thematic analysis to recognise arguments made

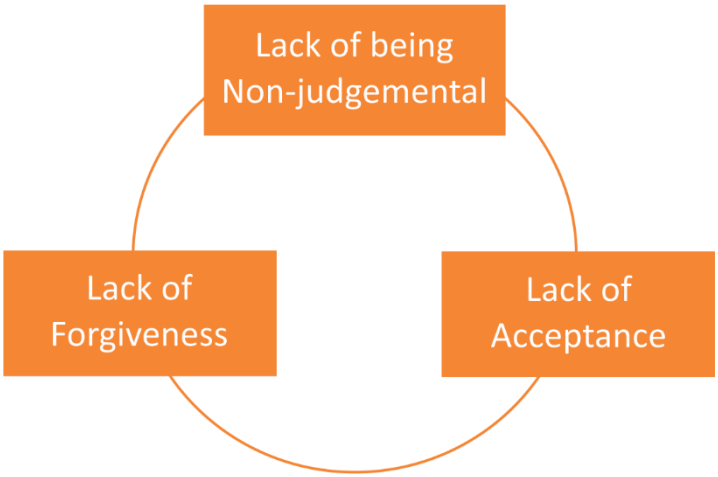
The participant explains the attempts to contact the client (sponsor) of the project and can be said to present the argument that

Argument 4/A-3.8: critical client feedback helped but should have been earlier

The participant seems to explain the 'moving' activities as explained by Valkenburg and Dorst (1998). What seems to be reflection on importance of client's feedback is during post project interviews.

Step 3.2: Applying model of inner values

The participant mentions the delay in client feedback as "*quite a bad thing*". The participant is thinking in terms of good and bad and is said to lack the inner value of being Non-judgemental. The participant mentions "*it could have been much earlier*" which can be said to show the lack of the inner value of Acceptance of other's views. Further repeating the phrase "*They should have*" can be said to show the lack of inner value of Forgiveness. The participant mentions this affecting the teamwork during DfSI project negatively. Thus, the inner values observed in the quote can be said to be {-N-A-F}, visualised as:



Participant 5 mentions that,

> "*To be honest, like, the beginning ... they didn't really affect me, because they weren't there when we were doing the process. But then I remember when they gave us feedback. At the start I was kind of pissed off, because, like we sent you all the stuff, if you got in contact with us constantly, we'd have avoided this time wasted, that we were doing something else with the brief.*"[Q5.9]

The quote mentions that client did not affect the teamwork during DfSI project because they were not available. When they did become available, the client provided negative feedback which angered the participant. The quote does not provide argument refuting the effective teamwork during DfSI project by team A, but it also does not provide argument in support of the effective teamwork during DfSI project. As there is no relevant argument arising from the quote, the quote can not be used for analysis.

Participant 10 mentions,

> "*The Akzonobel people, we emailed them and tried to contact them all the time. We didn't get anything from them accept during the interim, where the phase one went bad because we'd done the wrong thing and we'd gone off track. Whereas if we got feedback we would have stayed a bit on track. So it would've helped a lot to get more feedback*" [Q10.11]

Step 3.1: Thematic analysis to recognise arguments made

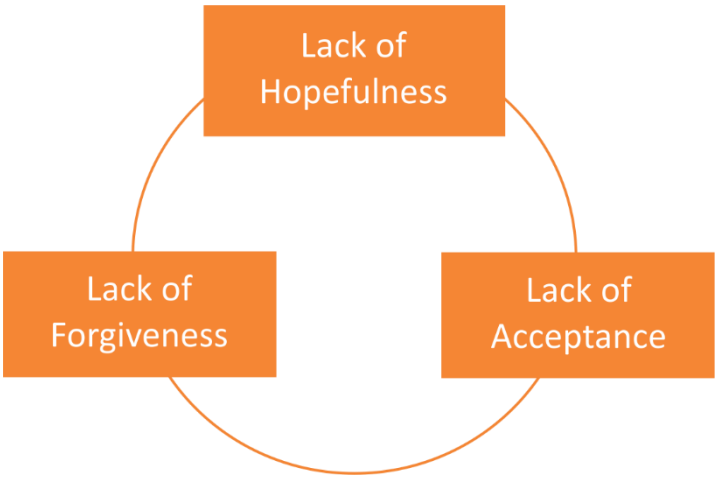
The quote explains that the team had gone off track and strayed from track because of lack of client feedback.

Argument 4/A-10.11: early feedback from client would keep team on track

The participant seems to explain 'framing' activities along with the 'moving' activities as explained by Valkenburg and Dorst (1998). What seems to be reflection on importance of client's feedback happened during post project interviews and cannot be said to have taken place during the project.

Step 3.2: Applying model of inner values

The participant mentions that the team did not give much feedback accept during the interim examination. The participant mentions "*didn't get anything from them*". The participant got the project brief and certain material from the clients which was the form of feedback a teamwork during DfSI projecter utilises in lieu of actual client involvement. The participant' remark can be said to show the team was not Hopeful and lost track. In the next section it is revealed that teamwork during DfSI project team was more influenced by the community. But in the quote, the participant mentions lack of client feedback as absence of feedback, which can be said to show lack of Hopefulness. The participant uses the phrase "*if we got feedback...*" which can be said to show lack of Acceptance and he blames the client "*we would have stayed a bit on track*" which can be said to show lack of inner value of Forgiveness. Thus, the inner values observed in the quote can be said to be {-H-A-F}, visualised as:



Participant 12 mentions,

> "*Well I think that (client feedback) was the deciding factor in the success of our project, because we'd just been left to our own devices and to continue on ... So we'd just been left to sort of crack on, and so there was no real checks and for me, a project like this, a design project, which this essentially was, is all about trial and error, you know, testing something out, if it works ... You know, you have to fail fast and fail early to get the good results, 'cause you know which ones, you know, it's trial and error, and so the fact that we didn't have that check, that external input, was a big factor*" [Q12.11]

Step 3.1: Thematic analysis to recognise arguments made

The participant highlights the importance of client feedback on the teamwork during DfSI project. He says it was deciding factor for success and the fact that there were no real checks affected the teamwork during DfSI project output. Thus, the argument provided can again be

Argument 4/A-12.11: early feedback from client would keep team on track

The participant seems to explain framing' activities along with the 'moving' activities as explained by Valkenburg and Dorst (1998).

Step 3.2: Applying model of inner values

The participant highlights the importance of client feedback during teamwork during DfSI project. The lack of client feedback, "*was a big factor*". But the participant does not blame anyone. The participant can be said to be Non-judgemental. Thus, the inner values observed in the quote can be said to be {+N}, visualised as:

{+N}

Step 4: Finding meaning in language for Subsection 4/A

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

The data can be said to show that the feedback from the client appropriately critiqued the ideas that the team presented and this was beneficial to the teamwork during DfSI project and to the solutions ultimately created (See argument 4/A-1.11 and argument 4/A-12.12: critical feedback from client gave direction to the efforts of the team and motivated the team). The usefulness of the feedback being of critical nature is therefore considered as meta argument arising from the data as Meta-Argument 1: Critical feedback from client was important because it gave direction and changed attitude of the group towards the project

The data can be said to show that the client delivered their critique on the ideas submitted by the team in such a way that the team was motivated and encouraged to provide better solutions by the end of the DfSI project (See argument 4/A-1.13: it was not just the content but the method in which the client explained the critical feedback that encouraged the team and also see argument 4/A-5.10: the client explained how the team had missed the brief and asked the team "*where is the passion?*" which motivated the team.) Therefore, it can be said that the meta argument arising is Meta-Argument 2: it was not just the content but the method in which the client explained the critical feedback that encouraged the team.

The data can be said to show that the team's earlier efforts were not completely wasted and the information they had collected was useful to take up a new direction for formalising solutions for the DfSI project (See argument 4/A-3.7: even though the team had to start all over again, they had all the research work ready). The data does not show any other argument in line with this and therefore, this argument is carried as meta argument 3.

On the other hand, data can be said to show that delay in providing feedback on the ideas created by the team had reduced enthusiasm during teamwork during DfSI project (See argument 4/A-1.10: delayed feedback from client reduced enthusiasm during teamwork for DfSI project). The data can be said to show other side effects of delayed feedback but this is the only argument regarding enthusiasm during teamwork and is carried forward as meta argument 4.

The late feedback is discussed on number of instances in the data and the need and effort to gain early feedback is expressed (See arguments 4/A-3.8 and argument 4/A-5.9: critical client feedback helped but should have been earlier). The reason which the data explains for need for early feedback is that the team could save time and effort and could have focussed in the

needed direction sooner (See argument 4/A-1.12: early feedback from the client could have affected the teamwork during DfSI project positively by saving time and creating better results. Also see argument 4/A-10.11 and argument 4/A-12.11: early feedback from client would keep team on track). These arguments provide the meta argument 5: early feedback from client would keep team on track and saved time for the team.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: critical feedback from client was important because it gave direction and changed attitude of the group towards the project

Evidentiary quote: Q1.11, Q12.12

Brief summary of findings from thematic analysis: The critique on ideas that the client provided was considered essential for providing direction to the teamwork during DfSI project by team A.

Inner value observed in the data: Acceptance (Q1.11, Q12.12), being Non-judgemental (Q1.11), having Beginner's mind (Q12.12)

Evidence: The data can be said to show that team members were not just accepting but appreciating the critique that the client provided on the ideas that the team presented. The team used the critique to let go their preconceptions about the project and changed their strategy and outcomes according to the client's feedback. Thus, the team can be said to show acceptance of situation and the team was non-judgemental towards the feedback and kept beginner's mind. This can, therefore, be said to can be said to show that the observations made by applying the proposed model of inner values can be confirmed to be appropriate.

Findings: The inner value of being Non-judgemental (Q1.11), Acceptance (Q1.11, Q12.12) and Beginner's mind (Q12.12) are appropriate observations as inner values of the team with regard to the theme.

Meta-Argument 2: it was not just the content but the method in which the client explained the critical feedback that encouraged the team

Evidentiary quote: Q1.13, Q5.10

Brief summary of findings from thematic analysis: The client (sponsor) of the project provided feedback in such a way that the team was motivated again to perform better.

Inner value observed in the data: Acceptance (Q1.13), being Non-judgemental (Q1.13), having Beginner's mind (Q5.10) and Forgiveness (Q1.13, Q5.10)

Evidence: As discussed before, the acceptance of critique existed within the team. But the acceptance of motivational bit from the client also can be interpreted from the data. The team can be said to be non-judgemental towards both the critique of ideas and that of the team's enthusiasm and they did not get stuck in this which can be said to show forgiveness towards client. The beginner's mind towards own attitude and enthusiasm can also be noted and therefore, it can be said that the observations from the application of the proposed model of inner values are appropriate in the context.

Findings: Acceptance (Q1.13), being Non-judgemental (Q1.13), having Beginner's mind (Q5.10) and Forgiveness (Q1.13, Q5.10) are recognised as the inner values of the team.

Meta-Argument 3: even though the team had to start all over again, they had all the research work ready

Evidentiary quote: Q3.7

Brief summary of findings from thematic analysis: The team was not set back as much as they could be because they had done a lot of work and collected a lot of information which helped them to re-interpret the ideas and outcomes of their DfSI project.

Inner value observed in the data: Acceptance (Q3.7), having Beginner's mind (Q3.7) and Forgiveness (Q3.7).

Evidence: The team decided to re-interpret the information based on the feedback the client had provided and this can be said to show beginner's mind as explained in meta argument 1. The team accepted that work had to be redone and accepted the benefits and drawbacks of their approach in using the information they collected from stakeholders. The team also did not blame client or stakeholders and instead took it upon themselves as the people responsible for their state. However, while doing this, the team cannot be said to dwell in such thoughts and they forgave not only stakeholders and client, but also themselves.

Findings: Acceptance, having Beginner's mind and Forgiveness are the inner values of the team as seen in the evidence (Q3.7).

Meta-Argument 4: delayed feedback reduced enthusiasm during teamwork during DfSI project

Evidentiary quote: Q1.10

Brief summary of findings from thematic analysis: The delay in providing feedback was perceived as one of the reasons for the reduction in team morale.

Inner value observed in the data: lack of Acceptance (Q1.10), lack of Patience (Q1.10) and lack of Forgiveness (Q1.10)

Evidence: The team accepted late feedback and when they lost morale, it can be said that they were losing patience because of the uncertainty surrounding outcomes of their DfSI project. Thus, the acceptance and lack of patience van be said to be valid observations for the team. On the other hand, the team did not dwell in either lateness or critique provided by the client in their feedback. The lack of forgiveness was observed based on repetition of words by a participant and it can be said that this was during the post-project interview and cannot be confirmed to exist as an inner value during the project.

Findings: lack of Acceptance (Q1.10) and lack of Patience (Q1.10) are valid inner values observed in the team and lack of Forgiveness (Q1.10) is not valid observation.

Meta-Argument 5: early feedback from client would keep team on track and saved time for the team

Evidentiary quote: Q1.12, Q3.8, Q5.9, Q10.11, Q12.11

Brief summary of findings from thematic analysis:

Inner value observed in the data: lack of Acceptance (Q1.12,Q 3.8, Q10.11), lack of inner value of Patience (Q1.12, Q12.11), lack of inner value of being Non-judgemental (Q3.8) and lack of inner value of Forgiveness (Q1.12, Q3.8, Q10.11).

Evidence: The reason which the argument explains for need for early feedback is that the team could save time and effort and could have focussed in the needed direction sooner. The argument does not speak to what was effect on the team's work accept that the team had tried to obtain feedback by getting in touch with the client. Similarly, teamwork during DfSI project could have been better is a hypothetical presented in the argument. Thus, the observation on inner values from such argument cannot be considered valid observations as they do not directly speak to the teamwork during DfSI project.

Findings: The argument is a speculation and cannot provide tangible information about the inner values that can be justified to exist in the team while applying teamwork during DfSI project.

Summarization of Findings and observation for subsection 4/A

Thematic analysis

Meta-Argument 1: critical feedback from client was important because it gave direction and changed attitude of the group towards the project

Members of team A explained that critically assessed feedback, both positive and negative, from the client, was important to their teamwork because it gave direction to the project, which in-turn changed the attitude of the team toward the project and motivated them (See argument1.11 and argument12.12).

Meta-Argument 2: it was not just the content but the method in which the client explained the critical feedback that encouraged the team

It was not just the content but also the way in which the client explained the feedback that encouraged the team (See argument 4/A-1.13 and argument 4/A-5.10). Client's (sponsor) input became part of 'naming' activities, which, according to the explanation from Valkenburg and Dorst (1998), is the activity of understanding the project brief. Feedback from the client was considered important because the team may have become overly influenced by input from the community stakeholders. The client (sponsor) reminded the team of the practical aspects such as financial viability.

Meta-Argument 3: even though the team had to start all over again, they had all the research work ready

Such 'naming' activities did not require new 'frames' because the team already had all the information that they required (See argument 4/A-3.7). The feedback from the client led to new 'moving' activities, also some 'reflecting' activities within the team. The reflecting activities can be seen when the team accepted that they had become overly influenced by input from the community.

Meta-Argument 4: delayed feedback reduced enthusiasm during teamwork during DfSI project

The delay in providing feedback was perceived as one of the reasons for the reduction in team morale during the DfSI project.

Meta-Argument 5: early feedback from client would keep team on track

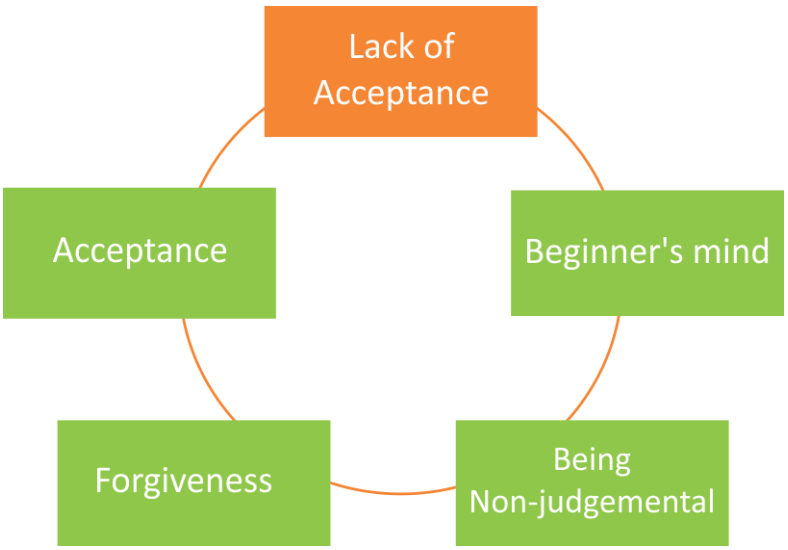
Though their initial thought was that, early input from the client could have saved their time and effort, but later the team reflected and realised that they should have considered the practical aspects themselves and they took the responsibility for the shortcomings of the solutions they had proposed. This may have helped the team to move past the incidence and

focus on the final outcomes with a positive attitude (See argument 4/A-1.12, argument 4/A-3.8, argument 4/A-5.9, argument 4/A-10.11 and argument 4/A-12.11).

Inner values

The inner value system of team A was mostly positive. The team initially lacked the inner value of, 'acceptance of the situation' (Q1.10) when the client was not available to provide input/feedback. However, the team included their input into final solutions, which has been interpreted as the inner value of, 'beginner's mind' (12.12, Q5.10). The team decided to move past the lack of feedback and decided not to blame the client for the team getting distracted, which can be said to show the inner value of, 'acceptance' (Q1.11, Q12.12, Q1.13), 'forgiveness' (Q1.13,Q5.10) and 'being non-judgemental' (Q1.11, Q1.13) which can be represented as +A-A+B+N+F

Figure 16: Inner values of team A toward client input for effective teamwork during DfSI project



Reflection

The participants speculate about early feedback from client would have been helpful. But they also seem to be taking responsibility for waiting for feedback and not thinking the same things on their own. The participants mostly reflect on the 'framing' activities which were affected by client input. The perception or 'frame' of the teamwork was influenced by community users and stakeholders until interim when sponsor's input changed the 'frame' and therefore the following 'moving' activities.

1.4.2 Analysis of team B

Step 3: Making Observation for Subsection 4/B

Participant 2 mentions that

> "*The thing is with the client, we tried contacting them from the beginning because they said, "Oh yeah, you guys can email us you know we're a client, let you know how you feel, on the right track", and stuff, so we tried emailing them, got no replies from them at all. So they had very, very little input, and then they came like a week before the deadline for an interim only to tell us that, "Oh yeah, you guys haven't done enough work", or, "This is not what we're looking for". And I thought, I mean, "We've been trying to contact you all this while just to get feedback to if we're on track, and then you just come a week before the deadline for an interim only to tell it us that". It was, I mean it was really annoying. It was, just the lack of communication was ridiculous. It was ridiculous. I mean yes, it was quite helpful because then we knew what they wanted, which if they'd told us weeks before then we'd have had a more solid thing to keep at. But yes, I think quite helpful… it helped us shape our ideas a lot better, given us direction rather than squabbling and got better feedback in the final one, presentation. But it was too late.*"[Q2.18]

Step 3.1: Thematic analysis to recognise arguments made

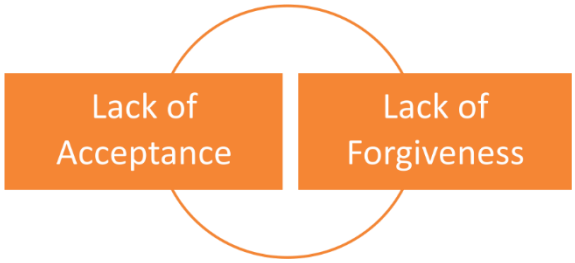
The participant explains the implications of late meeting with client and can be said to present argument that

Argument 4/B-2.18: delayed client feedback led to lack of direction and inter-personal problem within the team

The participant seems to explain a variety of activities- understanding project brief, an appropriate frame of reference, a strategy for actions, understanding about past decisions and actions. Thus, using explanation by Valkenburg and Dorst (1998), the argument can be said to refer to 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mentions that the "*lack of communication was ridiculous*" with the client. Also the participant uses the phrase"*it was really annoying*". These phrases suggest that the participant can be said to show lack of Acceptance. The participant repeats the phrase "*It was ridiculous*" which can be said to show lack of the inner value of Forgiveness. The participant's views clearly mention the adverse effect of client feedback on the teamwork during DfSI project of team B. Thus, the inner values observed in the quote can be said to be {-A-F}, visualised as:



Participant 6 mentions,

> "*Because we had the interim two weeks before our deadline, so if ... and then that changed track. We changed track a little bit more adjusted to what they wanted originally, so we changed back, so we'd spent a period of time not really knowing what we were doing, so that meant the two weeks was really rushed, so that would have been nicer to have longer time. Obviously a week to focus - Yeah, post-interim, 'cause we knew what we were doing then. But we got it done, anyway. It was very stressful, but I thought it was good criticism though, like, where everyone else thought it was really negative, I thought it was good, constructive criticism. It made me more focused and, "Yeah, I know what I need to do now". It's just like, I think I could just focus on what I needed to do, although I was extremely stressed. I was miserable.*" [Q6.6]

Step 3.1: Thematic analysis to recognise arguments made

The participant also explains implication of late feedback from client and can be said to argue that

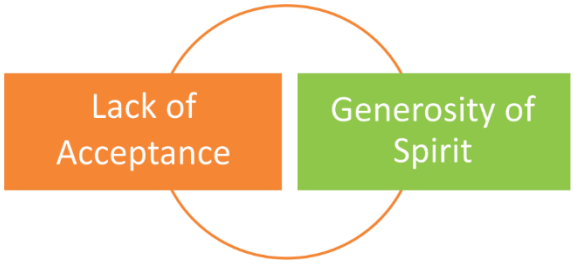
Argument 4/B-6.6: the delay in client feedback led to the team not knowing what they were doing

The participant also seems to explain same activities as earlier comment- understanding project brief, an appropriate frame of reference, a strategy for actions, understanding about past decisions and actions. Thus, using explanation by Valkenburg and Dorst (1998), the argument can be said to refer to 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant mentions that for her the client feedback was constructive criticism but for the team it was very negative and the delay in client feedback made it stressful in the final weeks. The participant mentions "*It was very stressful"* which can be said to show lack of Acceptance of other's views, in this case the client's views for delay. However, the participant can be said to show Generosity of spirit when she mentions "*I thought it was good, constructive criticism*". This directly affected the participant's input into the teamwork during DfSI project. The participant also mentions, "*everyone else thought*" but it is mere observation of everyone's opinion in her team and not a judgement. The phrase "*It made me*

more focused" can be said to show existence of the inner value of Patience in the participant, but this view, as she mentions, was not shared by the team. So the inner value of Patience cannot be considered as value of the team. Thus, the inner values observed in the quote can be said to be {-A+G}, visualised as:



Participant 11 mentions

> "*Client feedback was so late, we didn't know what direction to go until then. So when we tried taking any direction then there was resistance, "O, this isn't right" or "O this isn't needed". So I think client's feedback that we get really does affect, especially in our case, it affected our attitudes- yes negatively, because we had conflicts due to that* (lack of client feedback)." [Q11.10]

Step 3.1: Thematic analysis to recognise arguments made

Again, the participant explains implications from lateness in acquiring client feedback and can be said to argue that

Argument 4/B-11.10: the delay in client feedback led to lack of direction and misunderstanding in team

The participant explains effect on various aspects of the project and the team's attitude during the discussion. Thus, using explanation by Valkenburg and Dorst (1998), the argument can be said to refer to 'naming', 'framing', 'moving' and 'reflecting' activities.

Step 3.2: Applying model of inner values

The participant blames the client for the lack of direction that led to conflicts in the team. The participant also repeats the phrase "*this isn't right*" to show the conflict within the team. It can be said that the participant lacks the inner value of Forgiveness towards client and the team. Thus, the inner values observed in the quote can be said to be {-F}, visualised as:

Further the participant adds,

"*At interim we got negative feedback. The client pointed out that we had missed the brief and misunderstood what was expected from us. I tried explaining to them in detail. I was quite angry initially because we had gone ahead with ideas as they had not been in contact with us. The interim was miserable. At the end we did give the client what they wanted. But we would have had much smoother working if they were clear on the brief from the beginning.... Afterwards* (after the interim exam) *we worked mostly individually- yes, because of conflict.*"[Q11.11]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains the team's experience immediately after and during weeks following the client providing feedback. The argument made can be said to be:

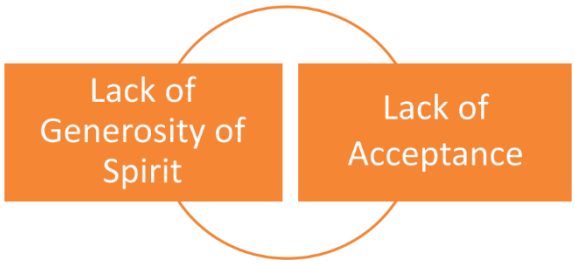
Argument 4/B-11.11: after the interim examination, the teamwork during DfSI project was really rushed and stressful

The participant explains 'moving' activities done after the interim exam.

Step 3.2: Applying model of inner values

This quote touches two aspects, first the content of the client's feedback and the reaction it ensued and then, the post interim work of the team. The participant remembers being "*angry*" show lack of Generosity of spirit to accept a late feedback. These lead to the evidence of lack of the inner value of Acceptance of other's views, in this case client's views seen from the wishful thinking in the phrase "*would have had much smoother working if...*".

The evidence strongly indicates the teamwork during DfSI project affected due to client feedback being not received in the positive light. Thus, the inner values observed in the quote can be said to be {-G-A}, visualised as:



Step 4: Finding meaning in language for Subsection 4/B

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

Members of team B experienced a lack of direction during teamwork for their DfSI project. The members of the team expressed that this lack of direction was because the clients (sponsors) were not available to provide input or feedback. The members also believe that this lack of direction led to disparity in the understanding of the project-requirements within their team, also in the strategy for the project that different team members proposed (See argument 4/B-6.6 and argument 4/B-11.10). This in-turn caused inter-personal problems within the members of team B (See argument 4/B-2.18). The meta argument derived from the data can be said to be Meta-Argument 1: the delay in client feedback led to lack of direction and consequently led to conflicts within the team.

The team's fixation on the past delay by client to provide feedback can be said to have affected the teamwork after the interim exam when client provided feedback because, the members describe teamwork after the client's input as rushed and stressful, where the members worked individually rather than as a team because of inter-personal problems (See argument 4/B-11.11). The reason for this poor teamwork remains the inter-personal differences stemming from lack of common strategy and differences in vision of the project (See argument 4/B-2.18 and argument 4/B-6.6). Thus the meta argument arising can be said to be Meta-Argument 2: after the interim examination, the teamwork during DfSI project by the team was really rushed and stressful and an individual effort.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: the delay in client feedback led to lack of direction and consequently led to conflicts within the team.

Evidentiary quote: Q2.18, Q6.6, and Q11.10

Brief summary of findings from thematic analysis:

Inner value observed in the data: lack of Acceptance (Q2.18, Q6.6) and lack of Forgiveness (Q2.18, Q11.10)

Evidence: Every teamwork during DfSI project has to face complex variable when dealing with external inputs. The teamwork during DfSI project does this because the client's or other stakeholder's input is important during teamwork during DfSI project.

However, when situations occur, the ability to accept the scenarios and continue is very important. Evidence suggests that the team had conflicts due to lack of direction (Q 11.10). The lack of direction has been linked by the team to the delay in client feedback (Q6.6). The delay of client input was not acceptable to the team. Thus, the lack of Acceptance can be said to be a valid observation in the evidence. Evidence suggests that the team could not forgive each other for the conflict (Q2.18, Q6.6, Q11.10). This led to most team members considering the client feedback as negative (in terms of critique) (Q6.6). Thus, the lack of inner value of Forgiveness can also be considered a valid observation from the application of the proposed model of inner values.

Findings: Lack of Acceptance (Q2.18, Q6.6) and lack of Forgiveness (Q2.18, Q11.10) are recognised as inner values for the team.

Meta-Argument 2: after the interim examination, the teamwork during DfSI project by the team was really rushed and stressful and an individual effort.

Evidentiary quote: Q2.18, Q6.6, and Q11.11

Brief summary of findings from thematic analysis:

Inner value observed in the data: Lack of Acceptance (Q2.18, Q6.6, and Q11.11), lack of Forgiveness (Q2.18, Q11.11), Generosity of spirit (Q6.6) and lack of Generosity (Q11.11)

Evidence: Evidence can be said to show that the negative feedback was acknowledged by one of the members as helpful (Q6.6) and not by another (Q11.11). Thus, the observation about inner value of Generosity of spirit cannot be made out as inner value of the team from the evidence provided (Q6.6, Q11.11). Evidence can be said to show that the team could not accept past conflicts and could not work together after the client feedback provided direction. Thus, the observation of lack of inner value of Acceptance is validated (Q2.18, Q6.6, and Q11.11). The evidence can be said to show that the team did not co-operate with each other as explained in the above meta argument, the observation of lack of inner value of Forgiveness (Q2.18, Q11.11) is a valid observation from application of the proposed model of inner values.

Findings: Lack of Acceptance (Q2.18, Q6.6, and Q11.11) and lack of Forgiveness (Q2.18, Q11.11) are the inner values of the team.

Summarization of Findings and observation for subsection 4/B

Thematic analysis

Meta-Argument 1: the delay in client feedback led to lack of direction and consequently led to conflicts within the team.

Members of team B experienced a lack of direction during teamwork for their DfSI project. The members of the team expressed that this lack of direction was because the clients (sponsors) were not available to provide input or feedback. The members also believe that this lack of direction led to disparity in the understanding of the project-requirements within their team, also in the strategy for the project that different team members proposed (See argument 4/B-6.6 and argument 4/B-11.10). This in-turn caused inter-personal problems within the members of team B (See argument 4/B-2.18). *Meta-Argument 2*: after the interim examination, the teamwork during DfSI project by the team was really rushed and stressful and an individual effort.

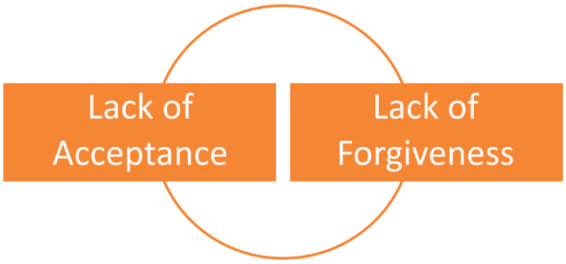
Meta-Argument 2: after the interim examination, the teamwork during DfSI project by the team was really rushed and stressful and an individual effort.

The team's fixation on the past delay by client to provide feedback can be said to have affected the teamwork after the interim exam when client provided feedback because, the members describe teamwork after the client's input as rushed and stressful, where the members worked individually rather than as a team because of inter-personal problems (See argument 4/B-11.11). The reason for this poor teamwork remains the inter-personal differences stemming from lack of common strategy and differences in vision of the project (See argument 4/B-2.18 and argument 4/B-6.6).

Inner values

The inner value system of team B needs to indicate the effect of client's input on their teamwork during the DfSI project. The team members believe that the client not being available was the leading cause for the problems that their team faced and this reveals that the team lacked the inner value of, 'forgiveness' (Q2.18, Q11.10) toward the client and lacked, 'acceptance of the situation' (Q2.18, Q6.6, and Q11.11). The team ended up integrating the input from their client (sponsor) despite their misgivings toward the late feedback and this can be said to show, 'generosity of spirit' (Q2.18, Q6.6, and Q11.11).

Figure 17: Inner values of team B toward client input for effective teamwork during DfSI project



Reflection

The team believes that because client was not available to provide clear understanding of brief, which is 'naming' activity, their team did not know which direction to take, which is lack of common 'frame' between members of the team. This led to intense discussions and inter-personal problems during 'naming', 'framing' and 'moving' activities. The experience of the team can be said to reveal that a consensus is required during different activities without which the team faced inter-personal problems and blamed client as a source of problems.

1.4.3 Analysis of team C

Step 3: Making Observation for Subsection 4/C

Participant 4 reflects on the effect of client on the teamwork during DfSI project during the social innovation project and mentions,

> "*My performance, 'cause I really wanted to produce something that Client would be happy with, 'cause from the beginning she was someone that I, I don't know, clicked with, and I found her really interesting, so I wanted to try and provide something for her that she would be proud to show to other people as well, so that's where my initial enthusiasm came from, 'cause I wanted to please Client in a way. I don't think the other group saw it as that, they were just like, "Oh, it's just some mad lady, wants to talk about parking and stuff", but I sort of understood where she was coming from, and after doing the research with the CEOs, I was even more into doing that, and so I didn't see just Name as the client. Also Name, the lady we've been seeing in Newcastle, going to her and getting her help on things was really good.*"[Q4.11]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains the effect of client feedback on teamwork and can be said to provide argument that:

Argument 4/C-4.11: the client input provided enthusiasm

The participant can be said to refer to 'moving' activities paving way for enthusiasm as 'frame' while working towards the DfSI project within team.

Step 3.2: Applying model of inner values

The participant uses phrases such as "*wanted to try and provide something...*" which show the inner value of Hopefulness for co-operation. Further, the participant mention wanting to make client happy. The participant mentions that this provided initial enthusiasm which affected teamwork during DfSI project positively in team C. The participant also mentions "*I sort of understood where she was coming from*" which can be said to show the inner value of Hopefulness for co-operation. Thus, the inner values observed in the quote can be said to be {+H}, visualised as:

The participant continues,

> "*I really like critical feedback. I want people to tell me the honest truth about what they see, 'cause otherwise it's pointless if they fanny about the point, 'cause it's not*

what they want, and when Client came she's so enthusiastic about everything, and she's like, "Oh this is great! This is great!" but didn't actually can be said to show that she had any negative feedback so you had to sort of gauge by how happy she was about it which ones were the worst ideas, so the ones she was like, "Oh yeah ... that's good", and then other ones she'd be like, "Oh, this is brilliant", so you'd sort of guess well that was the one she liked, and this one was the one she didn't like, so ... 'Cause we only had one meeting with her during it, and so ... I would have like to have a couple more. " [Q4.13]

Step 3.1: Thematic analysis to recognise arguments made

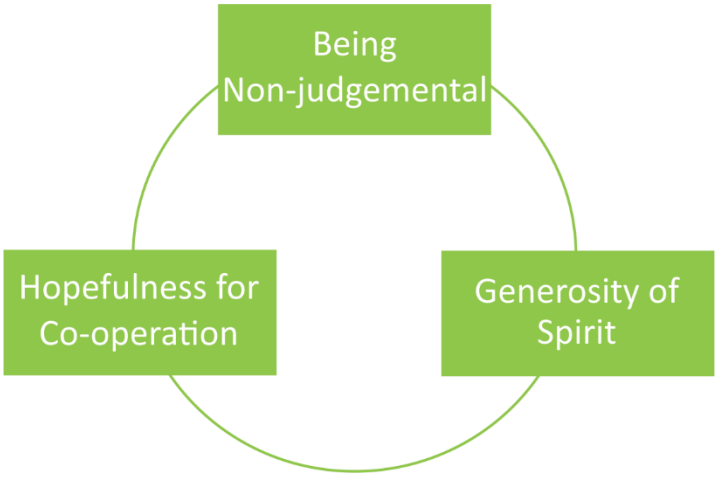
The participant explains the nature of client's feedback and the steps taken by the team to understand the, and the argument presented can be said to be

Argument 4/C-4.13: Non-critical feedback from client led the team to be innovative in gauging the client's real response based on her excitement towards an idea

The participant can be said to referring to 'moving' activity of getting feedback from client and then building new 'frame' by 'reflecting' on their response.

Step 3.2: Applying model of inner values

The participant mentions "*you had to sort of gauge"* which can be said to show that the inner value of Generosity of spirit that the participant showed towards the client. The participant wishes "*I would have like to have a couple more* (meetings)" which can be said to show the lack of Acceptance, in this case the lack of Acceptance of the non-critical views by the client. Indeed, every team during DfSI project wishes to have more meetings with clients. This wishing is an indicator that the views gathered during the meeting with client are not enough. It is not a bad thing in itself to want better suited outcomes for the clients. The participant can be said to show the inner value of being Non-judgemental towards client and the Generosity of spirit for the client as seen above. These lead to Hopefulness for co-operation with client. Thus, the inner values observed in the quote can be said to be {+N+G+H}, visualised as:



Participant 7 mentions,

> "*Yeah, I liked the critique ... The only thing she said about social media, she wanted more social media. About the ideas we had, she didn't ... she just said ... She literally just said, "I love everything. This is great. This is fabulous". Every idea that we had, "Oh, it's fabulous. I love it". You think, "Do you really love it, or ... ?" Yeah, I don't think it was that helpful, 'cause there wasn't any ... even like, constructive criticism I think is what you need, 'cause they don't like something and they want something improving, they're the client. Your job is to give them what they want, really. If they don't tell you, how are you supposed to do it? Yeah. Not in a bad way, that's just the way the course is set up all the way through, It made us work harder to guess what she liked*."[Q7.20.]

Step 3.1: Thematic analysis to recognise arguments made

The participant also reflects on the nature of client feedback and can be said to argue that:

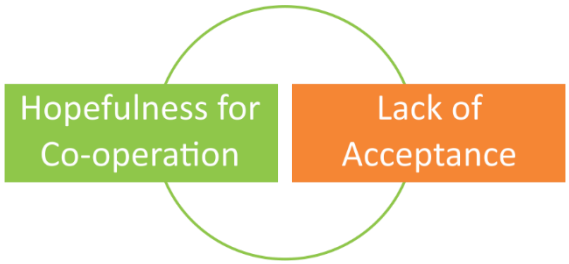
Argument 4/C-7.20: client feedback did not provide critique and therefore was not as helpful as it could be

The participant explains 'framing' activity difficult when client feedback was not critical enough.

Step 3.2: Applying model of inner values

The participant mentions "*I don't think it was that helpful*" about the "*I love everything"* feedback from the client. The participant can be said to show the lack of the inner value of Acceptance of other's views. This leads the participant to repeat the phrase "she just said ... She literally just said". The repetition can be said to show the participant lacks the inner value of Forgiveness. These two strongly refute the effective teamwork during DfSI project practice by team C. But the participant further adds, "*If they don't tell you, how are you supposed to do it? Not in a bad way*" which can be said to show the participant is Hopeful for

co-operation. Also can be said to show lack of inner value of Acceptance of blanket positive feedback. Thus, the inner values observed in the quote can be said to be {+H-A-F}, visualised as:



Participant 9.4 mentions,

> "*No, I think I would be more at ease if I know the client as well as Name, 'cause all this whole project, I think (*another team member*) knows most about client and all these people we've been working with. She's this person who's going out and meeting people. So she knows what client wants better than I do. Obviously, she comes with more specific ideas. I think it would be better if we all know them and we all know everything about the project, really... she's met her(the client) a couple of times, so she knows her, yeah, so it would just make sense that she goes and stuff, instead of the four of us go and not talk... Name did most of the talking, and I think one of the things that I would like to make better in the team might be every time (a participant) goes out and meets someone it would be nice to have like a catch-up session, 'cause she knows everything in her head, but she's not very good at communicating it out, and make sure the team knows what's going on and stuff, so I find that really hard. I wouldn't mind not meeting the client, 'cause I don't really like meeting people! I did come up with some ideas, but not as many as* (one of the participants) *'cause she knows everything, yeah ... but I think if I knew the client better, then I would know what they want and I think I might be more productive in terms of generating ideas, but then within the group I've got something else anyway, so it's alright, so it wasn't like I didn't do anything*."[Q9.4]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains what she could have done more with respect to client feedback and can be said to argue that

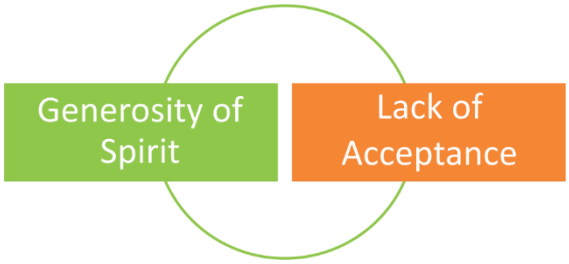
<u>Argument 4/C-9.4</u>: more involvement with client on personal basis would help during teamwork during DfSI project

The participant talks about 'naming' activities of meeting with client re-influencing 'frames' at looking at project.

Step 3.2: Applying model of inner values

The participant compromised not meeting client for ease of the client even though later she says "*I don't really like meeting people* she can be said to show Generosity of spirit.

However, the participant wishes "*it would be nice to have like a catch-up session*" and mentions that a team member "*knows everything in her head, but she's not very good at communicating it out"* This argument, though may seem to be judgemental, is not mentioned to blame the team member. The participant mentions it to point out the gap in knowledge being created and suggests a solution for it. This however, does show the participant lacks the inner value of Acceptance when she mentions "*I find that really hard".* This is again confirmed in the wishful thinking in the phrase "*if I knew the client better...*" which can be said to show the lack of Acceptance. Thus, the inner values observed in the quote can be said to be {+G-A}, visualised as:



Step 4: Finding meaning in language for Subsection 4/c

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

Members of team C explained that input from their client was a source of motivation for the team (See argument 4/C-4.11: the client input provided enthusiasm). As there are no other quotes presenting similar argument this is considered first meta argument.

The client at times provided feedback, which was not clear or was not critical. This required the team to be innovative in gauging the client's real response based on the level of excitement/enthusiasm towards an idea (See argument 4/C-4.13: Non-critical feedback from client led the team to be innovative in gauging the client's real response based on her excitement towards an idea). This refers to a 'moving' activity of getting feedback from the client and then building a new 'frame' by 'reflecting' on their response. However, team C believed that a more critically assessed response from the client would have been helpful (See argument 4/C-7.20: client feedback did not provide critique and therefore was not as helpful as it could be). Thus, the second meta argument can be said to be Meta Argument 2: client feedback not being critical made the team think innovatively (Q4.13, Q7.20).

One of the key stakeholders, also considered as a client by the team, could not meet the entire team on a regular basis and one member took the initiative in visiting her. Other members believe that meeting this client as a team would have helped ideation activities during their

DfSI project (See argument 4/C-9.4: more involvement with client on personal basis would help during teamwork during DfSI project). Again, there are no other quotes presenting similar argument this is considered third meta argument.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: client provided enthusiasm

Evidentiary quote: Q4.11

Brief summary of findings from thematic analysis: The client provided feedback and direction which helped team to be motivated.

Inner value observed in the data: Hopefulness (Q4.11)

Evidence: Evidence can be said to show that members of the team were non-judgemental towards the client, which can be said to show the team lacked of inner value of being Non-judgmental. Thus, the lack of inner value of being Non-judgmental (Q4.11) cannot be considered a valid observation after applying the proposed model of inner values. The observation of the inner value of Hopefulness is for one member of the team who states that the team tried to understand the feedback from client when the client did not provide a clear critique. Thus, the inner value of Hopefulness can be considered a valid observation after applying the proposed model of inner values.

Findings: The Hopefulness is a valid observation as inner values of the team (Q4.11)

Meta-Argument 2: Client feedback not being critical made the team think innovatively.

Evidentiary quote: Q4.13, Q7.20

Brief summary of findings from thematic analysis:

Inner value observed in the data: Hopefulness (Q4.13, Q7.20), Generosity of spirit (Q4.13) and lack of Acceptance (Q7.20)

Evidence: Evidence suggests that the members of the team wanted more contact with client to get feedback and to create better outcomes for the client. Thus, the inner value of Hopefulness (Q4.13, Q7.20) is a valid observation after applying the proposed model of inner values. Evidence further can be said to show that the team accepted the extra work of gauging the meaning of the positive feedback from the client. Thus, the inner value of Generosity of spirit (Q4.13) is a valid observation as inner value of the team. The inner value of Acceptance can be seen in the team not getting stuck but moving forward when they got a non-critical feedback. Thus, the observation of lack of the inner value of Acceptance cannot be considered valid (Q7.20).

Findings: Hopefulness (Q4.13, Q7.20) and Generosity of spirit (Q4.13) are recognised as the inner value of the team.

Meta-Argument 3: more involvement with client on personal basis would help during teamwork during DfSI project ideation

Evidentiary quote: Q9.4

Brief summary of findings from thematic analysis:

Inner value observed in the data: Generosity of spirit (Q9.4) and lack of Acceptance (Q9.4)

Evidence: Evidence can be said to show that the member of the team felt stuck because of lack of knowledge about client but the evidence also can be said to show that this did not stop the member from contributing in some other way. Thus, lack of Acceptance (Q9.4) is an invalid observation after applying the proposed model of inner values while generosity of spirit can be considered a valid observation.

Findings: Generosity of spirit (Q9.4) is the inner value of the team.

Summarization of Findings and observation for subsection 4/C

Thematic analysis

Meta-Argument 1: client provided enthusiasm

Members of team C explained that input from their client was a source of motivation for the team (See argument 4/C-4.11: the client input provided enthusiasm).

Meta-Argument 2: Client feedback not being critical made the team think innovatively.

The client at times provided feedback, which was not clear or was not critical. This required the team to be innovative in gauging the client's real response based on the level of excitement/enthusiasm towards an idea (See argument 4/C-4.13: Non-critical feedback from client led the team to be innovative in gauging the client's real response based on her excitement towards an idea). This refers to a 'moving' activity of getting feedback from the client and then building a new 'frame' by 'reflecting' on their response. However, team C believed that a more critically assessed response from the client would have been helpful (See argument 4/C-7.20: client feedback did not provide critique and therefore was not as helpful as it could be).

Meta-Argument 3: more involvement with client on personal basis would help during teamwork during DfSI project ideation

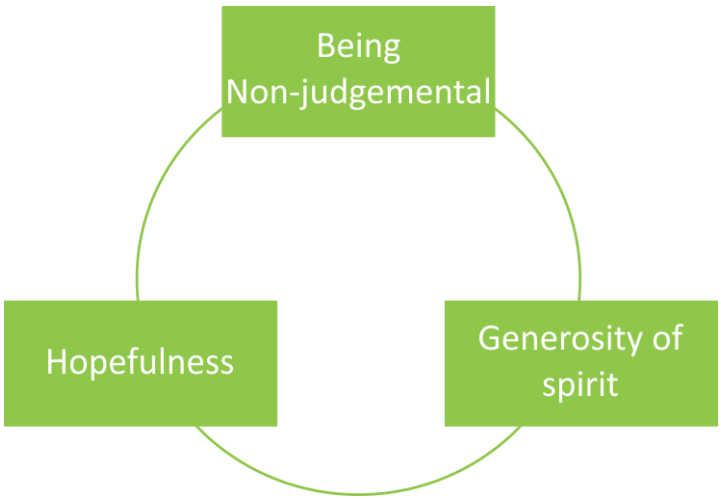
One of the key stakeholders, also considered as a client by the team, could not meet the entire team on a regular basis and one member took the initiative in visiting her. Other members

believe that meeting this client as a team would have helped ideation activities during their DfSI project (See argument 4/C-9.4: more involvement with client on personal basis would help during teamwork during DfSI project).

Inner values

The inner value system of team C needs to represent the effect of client input on their teamwork. The team used innovative ways to reflect on and interpret client's feedback which can be said to show the inner value of, 'being non-judgemental' (Q4.11, Q9.4), 'hopefulness for co-operation' (Q4.11, Q4.13, and Q7.20) and 'generosity of spirit' (Q4.13, Q9.4), visualised as:

Figure 18: Inner values of team C toward client input for effective teamwork during DfSI project



Reflection

Team C believed that 'naming', 'framing' and 'moving' activities were affected by input from the client. When there is no critical feedback, the participants depended on 'reflecting' activity to re-evaluate client feedback to the ideas that the team proposed.

1.5 Analysis of theme 5: The effect of community involvement on the team work during DfSI project

Step 2: Creating Data matrix to organise data:

Participant no.	Quotes that support effective teamwork during DfSI project		Quotes that refute effective teamwork during DfSI project	
Sub-section 5/A: Team A	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	Q1.16 Q3.11 Q3.12 Q5.13 Q5.15	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.5.1.	Q1.15 Q1.18 Q3.10 Q10.13 Q12.19	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.5.1.
Sub-section 5/B: Team B	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	Q6.9	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.5.2.	Q2.24 Q6.8 Q11.30	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.5.2.
Sub-section 5/C: Team C	Quote Number	Where to locate in the thesis	Quote Number	Where to locate in the thesis
	Q 9.8	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.5.3.	Q4.21	These quotes are presented with the arguments and inner values in Appendix 1 Section 1.5.3.

1.5.1 Analysis of team A

Step 3: Making Observation for Subsection 5/A

Participant 1 mentioned that,

> "*When we were speaking to people that had involvement in the community but weren't necessarily community members - so people like, people who worked for different organisations that are renovating the area or community groups in the area. They gave us feedback but they didn't have as much of a vested interest in it because they didn't live there. So we were able to maybe take a step back and think, right obviously the community want this but it isn't possible so maybe we could give them something similar...so, yeah, the community involvement has been really important for this task and I think it's, I think there is still elements of it in our final proposals*"[Q1.16]

Step 3.1: Thematic analysis to recognise arguments made

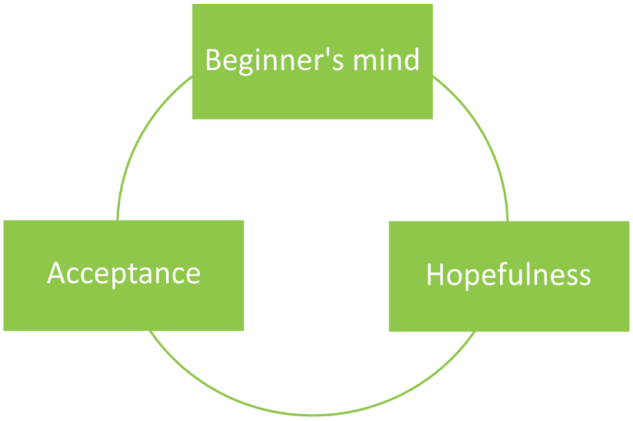
The quote can be said to show that the team recognised essential stake holders and acquired input

Argument 5/A-1.16: the team recognised essential stake holders and acquired input which provided alternative solutions

The participant can be said to be explaining 'moving' activity where members of community participated to build solution for themselves.

Step 3.2: Applying model of inner values

The participant mentions "*take a step back*" which can be said to show the inner value of having Beginner's mind. Further the participant mentioned, "*so maybe we could give them something similar..."* which can be said to show the inner value of Hopefulness for co-operation. The participant mentions "*I think there is still elements of it in our final proposals*" which can be said to show the inner value of Acceptance. Thus, the inner values observed in the quote can be said to be {+H+A+B}, visualised as:



Participant 3 reflected on the effect of community on the teamwork during DfSI project of team A and mentioned,

> "*They were quite positive about the project as well. So, and they would participate in whatever happened, they would be happy because they had already planning to work on a town centre. And this is where some of them wants to do something as well, so...yeah they will be happy to participate. Because it means that the town council who are, you know, like who are owning, like not owning but who are like governing Ashington. You know, they want to participate to its supporter*" [Q3.11]

Step 3.1: Thematic analysis to recognise arguments made

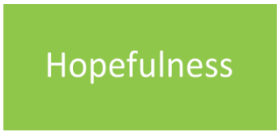
The participant explains effect of community input on their teamwork and can be said to argue that

Argument 5/A-3.11: getting support from the local council was encouraging and important

The participant can be said to be explaining 'moving' activity with stakeholders within the community

Step 3.2: Applying model of inner values

The participant uses phrases such as "*they will be happy to participate*" which show the Hopefulness for co-operation. Thus, the inner values observed in the quote can be said to be {+H }, visualised as:



Participant 3 reflected on the effect of community on the teamwork during DfSI project by team A and mentioned,

"*I mean there were some difficulties. Like, for example, we couldn't find a person responsible for something. I had to do research about shutters. I visited every single shop in the main street with the shutters. I visited 23 shops during one day and speak to whoever was there to ask about shutters and most of them, they said they don't know who's the owner and some of them they said they would never allow their shutters to be painted or, you know, things like that. So it was a bit difficult and after a few times you're just losing enthusiasm to ask more, you know...Yeah, but, yeah it was, you know, it's a part of the experience we are getting, from like every single one we are getting some kind of feedback*"[Q3.12]

Step 3.1: Thematic analysis to recognise arguments made

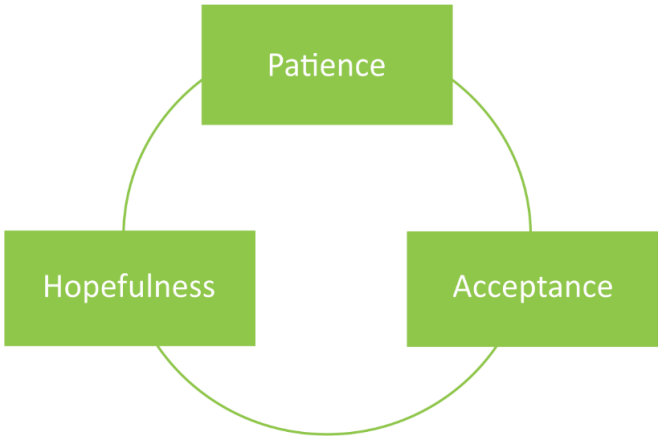
The participant explains the importance of gaining input from community and can be said to present an argument that

Argument 5/A-3.12: collecting information from community was difficult but every feedback mattered

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

Participant mentions "*you're just losing enthusiasm*" can be said to show lack of Patience. The participant further mentions "*it's a part of the experience we are getting*" which can be said to show the inner value of Acceptance. Further the participant mentions, "*from like every single one we are getting some kind of feedback*" which can be said to show Hopefulness for co-operation. Thus the finding from the quote is:



Participant 5 reflected on the effect of community input on the teamwork during DfSI project by team A and mentioned,

"*At first with the representatives, they are ... very hard to approach them, but at the same time they are just like the community people, like once you get their heart, kind of*

thing. Yeah, they're becoming alright. It's just, I think it's the starting bit. I guess it's because they are very busy people and you've got to stop wasting their time, and they thought that since I'm a student, it's just part of a project that'll be done in six months, in two months or something, and that's it, I don't need you any more, kind of thing" [Q5.13]

Step 3.1: Thematic analysis to recognise arguments made

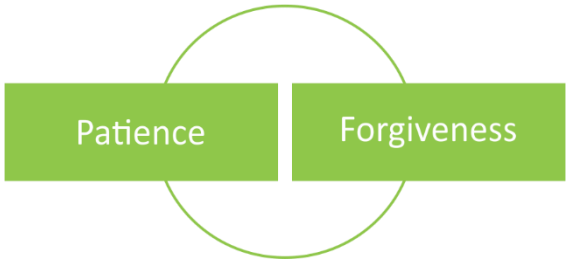
The participant explains their team's effort and can be said to argue that

Argument 5/A-5.13: being persistent with the local government helped in gaining feedback from stakeholders in the community

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

The participant uses the phrase "*once you get their heart, kind of thing.*" which can be said to show the inner value of Patience. Participant mentions "*they are very busy people*" which can be said to show the inner value of Forgiveness. Thus, the inner values observed in the quote can be said to be {+P+F}, visualised as:



Further the participant adds,

"*some of the people in that group thought that we were scammers. It's like, "If you're really doing something for AkzoNobel, then how come we've only met you, 'cause obviously it's an online thing, and people didn't really believe us straightaway, so from there it was kind of a hindrance, because that kind of affected the relationship between the people in the community hub, but I'm not blaming Name. It was a misunderstanding, but that was one of the hindrance, because people were like, "Who are you?" kind of thing, and it's the same as well when we came to Ashington, it's like, "Who are you and why are you asking us all these questions?", but once you become more persistent and just keep coming in and showing them that you don't mean any harm, you come in peace, kind of thing, they start trusting you, and yeah*"[Q5.15]

Step 3.1: Thematic analysis to recognise arguments made

The participant again explains the efforts of their team and argue that

Argument 5/A-5.15: persistent with community helped resolve misunderstandings

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

The participant mentions "*It was a misunderstanding*" which can be said to show the inner value of Forgiveness. The participant mentions "*you become more persistent*" which can be said to show the inner value of Patience and phrases such as "*you don't mean any harm, you come in peace*" which can be said to show the inner value of Hopefulness for co-operation.

Participant 1 reflected on the effect of community input on the teamwork during DfSI project by team A and mentioned,

> "*Quite a lot. I think that initially we overestimated the amount of involvement that the client wanted to have with the community. So that's why when we came to our first interim with them, our ideas were very focussed on community involvement and bringing different sections of the community together and we'd almost lost like commercial perspective on it. So it was very beneficial for the community but not so much for the company. So I think to a certain extent in the first half we let their opinions guide us too much.*"[Q1.15]

Step 3.1: Thematic analysis to recognise arguments made

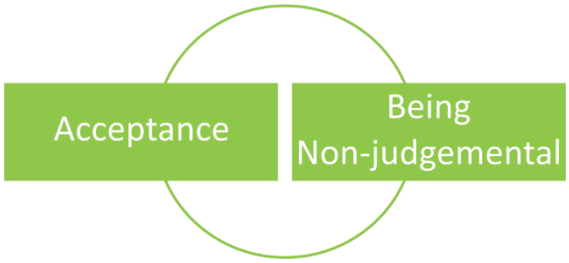
The participant explores the influence on community input on their teamwork and solutions generated and can be said to explain that

Argument 5/A-1.15: getting overly influenced by community affected solutions generated during DfSI project

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

The participant mentions phrases such as "*I think to a certain extent in the first half we let their opinions guide us too much*" which can be said to show the inner value of Acceptance. The participant does not think in terms of good and bad, fair and unfair and reports the event which can be said to show the inner value of being Non-judgemental. Thus, the inner values observed in the quote can be said to be {+A+N}, visualised as:



The participant further adds,

> "*I think it's how we interpret it. I think we can only, especially in this case, we can only ask the community what they want.... we knew what they wanted to change but I think that we almost, we tried to do too much.... I wouldn't change the feedback that we got from the community because it was really useful. But the way that we interpret it, I think that's what caused the problem*" [Q1.18]

Step 3.1: Thematic analysis to recognise arguments made

The participant takes responsibility of getting influenced by community input and can be said to argue that

Argument 5/A-1.18: interpretation of feedback from community affected the solutions generated during DfSI project

The participant can be said to be referring to 'reflecting' activity of working with community members.

Step 3.2: Applying model of inner values

The participant uses phrases such as "*I think it's how we interpret it*" and "*we tried to do too much*" which show the inner value of Acceptance. Participant says "*wouldn't change the feedback*" which can be said to show Hopefulness for co-operation. Thus, the inner values observed in the quote can be said to be {+H+A}, visualised as:

Participant 3 reflected on the effect of community on the teamwork during DfSI project of team A and mentioned,

"*I mean first of all it was a good source of information because that's why, you know, we're going there to ask people and talk to them. Some of them they didn't really sound very enthusiastic on what we are trying to propose. So, but we knew that we, I mean we knew that we are working for a client, so this is what we have to do and we didn't, you know, if someone said, "Oh they don't want to paint anything" you know, we cannot take it into consideration. Because this is what client wants and what it could be possible in Ashington if there's you town council agreement, things like that it will happen. So, yeah, so just mainly as a source of information. So, yeah, it was positive*"[Q3.10]

Step 3.1: Thematic analysis to recognise arguments made

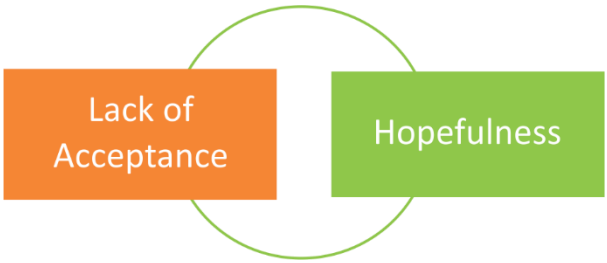
The participant explains team's attitude and can be said to provide argument that

Argument 5/A-3.10: negative attitude from community did not demoralise the team if the stakeholders had opposite ideas

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

The participant uses phrases such as "*what it could be possible ...things like that it will happen...*" can be said to show Hopefulness for co-operation and explains a negative incidence with "*we cannot take it into consideration*" which can be said to show lack of Acceptance. Thus, the inner values observed in the quote can be said to be {+H-A}, visualised as:



Further, participant 10 adds,

"*I don't think they affected me really. The Ashington community. No they didn't really affect me. I mean we went around and its just... I went around the town and you could see a decline through the reception and all. Its quite nice. It built motivation to help build some good ideas but I don't think the community affects me that much, anyone really would have been the same. Because what we thought Akzonobel was, we thought we wanted to help the community and find out what they want and at the end of the day the paint factory want to sell paint and obviously didn't give a crap about the*

community. So I just wanted what the client wanted because they are giving me work to do. I just want what they want out of it. 'cause that's your job isn't it? Just giving what they want really. It would be nice for the community but they didn't affect me that much. More the client and people who are marking and stuff."[Q10.13]

Step 3.1: Thematic analysis to recognise arguments made

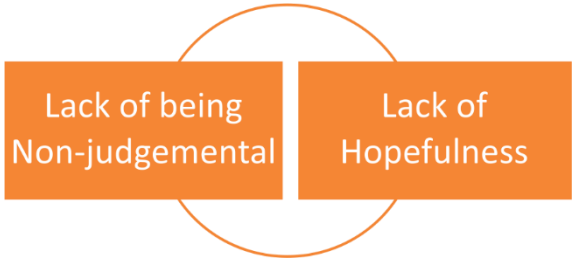
The participant can be said to explain effect of community input on their teamwork and explains that

<u>Argument 5/A-10.13</u>: community input provided motivation but did not matter as much as client feedback

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

The participant uses phrases such as "*I don't think the community affects me that much*" which show the lack of inner value of Hopefulness for co-operation. Which reiterated in the sentence "*the paint factory want to sell paint and obviously didn't give a crap about the community*" which also can be said to show the lack of inner value of being Non-judgemental. Thus, the inner values observed in the quote can be said to be {-N-H}, visualised as:



Participant 12 reflected on the effect of community input on the teamwork during DfSI project and mentioned,

"*It was interesting, because I'd never worked on a project with so many politics before, because there's internal politics within the university, and there's also external politics within Ashington on many levels and then AkzoNobel, our client, as well. At the end of the day, we're doing this for a client and so I had to remember towards the end - we got very sucked in, I got very sucked in and the team got very sucked in - to what the community wanted, and what the community were saying, 'cause those were the people we were dealing with on a daily basis, and so then when you had the client review, then you remembered that you were doing this for a client, and it's really at the end of the day whatever the client wants you've got to do that and so when we realised that,*

again, that was almost a bit refreshing. It was like, "Yeah, okay, we must do it for the client"[Q12.19]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains the effect of community input on the outcomes of the project and presents argument that

Argument 5/A-12.19: getting overly influenced by community affected outcomes

The participant can be said to be referring to 'reflecting' activity of working with community members.

Step 3.2: Applying model of inner values

The participant used phrases such as "*the team got very sucked in*" and "*whatever the client wants you've got to do that*" which can be said to show the inner value of Acceptance. Thus, the inner values observed in the quote can be said to be {+A}, visualised as:

Step 4: Finding meaning in language for Subsection 5/A

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

Team A recognised key stakeholders and community members and acquired their input during 'naming', 'framing' and 'moving' design activities, to create new ideas as outcomes of their DfSI project (See argument 5/A-1.16: the team recognised essential stake holders and acquired input which provided alternative solutions and argument 5/A-3.11: getting support from the local council was encouraging and important). Thus, the meta argument can be said to be that essential stakeholders were recognised by the team which helped the project and also the team's motivation

Collecting information and input from community stakeholders was challenging, but the team gave importance to community and stakeholder involvement and participation as their method for creating social innovation (See argument 5/A-3.12: collecting information from community was difficult but every feedback mattered). The team did not let negative responses from stakeholders in the community affect them (See argument 5/A-3.10: negative community feedback was not considered important if the stakeholders had opposite ideas) and persistently tried to create relationships, gather feedback (See argument 5/A-5.13: being persistent with the local government helped in gaining feedback from stakeholders in the community) and resolve misunderstandings (See argument 5/A-5.15: persistent with community helped resolve misunderstandings). This can be said to bring forth the second meta-argument that persistent efforts were taken to form relations with community and stakeholders (Q3.12, Q5.13 and Q5.15).

During the course of community engagement, the team became overly influenced by inputs from the community stakeholders (See argument 5/A-12.19: getting overly influenced by community affected outcomes). The solutions the team proposed satisfied community requirements but did not remain practical or within scope of the project brief, until the sponsors brought this to the team's attention during the interim examination (See argument 5/A-1.15: getting overly influenced by community affected solutions generated during DfSI project and argument 5/A-1.18: interpretation of feedback from community affected the solutions generated during DfSI project). This brings to the third argument the team was overly influenced by community (Q1.15, Q1.18,Q 12.19)

Community engagement remained a source of motivation for the team, and the team ultimately modified their proposals based on their project brief as well as input from the

community, which remained an essential part of the final solution proposed by the team (See argument 5/A-10.13: community input provided motivation but did not matter as much as client feedback). As there are no other similar arguments, this is carried as a meta argument on its own.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: essential stakeholders were recognised by the team which helped the project and also the team's motivation

Evidentiary quote: Q1.16, Q3.11

Brief summary of findings from thematic analysis: The team recognised and gathered information from essential stakeholders which was useful for designing solutions for the project and it also helped the teamwork during the DfSI project.

Inner value observed in the data: Beginner's mind (Q1.16), Hopefulness (Q1.16, Q3.11) and Acceptance (Q1.16)

Evidence: Evidence can be said to show that the team sought out the input from key stakeholders by building relationships which can be said to show that the team was hopeful for co-operation. Evidence also can be said to show that the team was able to let go their pre-conceptions about the DfSI project and use input from stakeholders such as members of community and local government etc. This can be said to show the beginner's mind. Evidence further can be said to show that the team showed Acceptance when community was disengaged or gave negative response and showed wisdom to be persistent. Thus, the observations made from applying the proposed model of inner values can be said to be appropriate.

Findings: Hopefulness for co-operation (Q1.16, Q3.11), having Beginner's mind (Q1.16) and Acceptance (Q1.16) are recognised as the inner values of the team.

Meta-Argument 2: persistent efforts were taken to form relations with community and stakeholders

Evidentiary quote: Q3.12, Q5.13 and Q5.15

Brief summary of findings from thematic analysis:

Inner value observed in the data: Hopefulness (Q3.12, Q5.15), Acceptance (3.12), Patience (Q5.13, Q5.15) and Forgiveness (Q5.13, Q5.15)

Evidence: As the evidence can be said to show that the team was making contacts with the community (Q3.12, Q5.15) and gathering information through persistent efforts as discussed before, it can be said that the inner value of hopefulness for co-operation.

Similarly, the inner value of Acceptance is seen in that the team did not get swayed by negative experiences. The inner value of Patience was required to be persistent and keep making contacts with the community (Q5.13, Q5.15). The inner value of Forgiveness is required to keep co-operating even when the community is not co-operating and evidence can be said to show that the team kept making contacts with community after initial misunderstanding and with local government after getting reply that they were busy. Thus, the team was persistent even when the community and its stakeholders could not co-operate (Q5.13). Thus, the observations made from applying the proposed model of inner values can be said to be valid.

Findings: Hopefulness (Q3.12, Q5.15), Acceptance (3.12), Patience (Q5.13, Q5.15) and Forgiveness (Q5.13, Q5.15) are verified as the inner values of the team.

Meta-Argument 3: the team was overly influenced by community

Evidentiary quote: Q1.15, Q1.18,Q 12.19

Brief summary of findings from thematic analysis:

Inner value observed in the data: Acceptance (Q1.15, Q1.18, Q 12.19), being Non-judgemental (Q1.15) and Hopefulness (Q1.18)

Evidence: Evidence can be said to show that when the team made error in judgement, they accepted it and did not regret or fester over it. Thus, the observation of the inner value of Acceptance after applying the proposed model of inner values can be considered valid (Q1.15, Q1.18, Q 12.19). The inner value of Hopefulness is a valid observation for the team as discussed in earlier meta-arguments (Q1.18). The inner value of being Non-judgemental is required for an objective view of the situation at hand. Evidence can be said to show that the team was Non-judgemental towards member of their team and towards client and community (Q1.15). Thus, observation is considered valid.

Findings: Acceptance (Q1.15, Q1.18, Q 12.19), Non-judgemental (Q1.15) and Hopefulness (Q1.18) are confirmed as inner values of the team.

Meta-Argument 4: the team considered part of the community feedback as not relevant

Evidentiary quote: Q3.10, Q10.13

Brief summary of findings from thematic analysis: The negative experience from community was ignored by the team and they persistently tried to get community involved.

Inner value observed in the data: lack of Acceptance (Q3.10), Hopefulness (Q3.10, Q10.13) and lack of being Non-judgemental (Q10.13)

Evidence: Thus, lack of Acceptance is an invalid observation for the team in the evidence (Q3.10) because the team showed wisdom not to accept but change situation and expert design practitioners consider this as essential for DfSI project. Further, evidence can be said to show that the team was hopeful even with negative feedback from the community, and believed that with the client support and support from local government could make things happen. This validates the observation of Hopefulness as the inner value of the team (Q3.10, Q10.13). The inner value of being Non-judgemental is required to objectively report a situation. Evidence can be said to show that the member has generalised an observation. However, it cannot be determined if this was during post project interview or during teamwork during DfSI (Q10.13).

Findings: The inner value of Hopefulness for co-operation is confirmed as an inner value of the team.

Summarization of Findings and observation for subsection 5/A

Thematic analysis

Meta-Argument 1: essential stakeholders were recognised by the team which helped the project and also the team's motivation

Team A recognised key stakeholders and community members and acquired their input during 'naming', 'framing' and 'moving' design activities, to create new ideas as outcomes of their DfSI project (See argument 5/A-1.16: the team recognised essential stake holders and acquired input which provided alternative solutions and argument 5/A-3.11: getting support from the local council was encouraging and important).

Meta-Argument 2: persistent efforts were taken to form relations with community and stakeholders

Collecting information and input from community stakeholders was challenging, but the team gave importance to community and stakeholder involvement and participation as their method for creating social innovation (See argument 5/A-3.12: collecting information from community was difficult but every feedback mattered). The team did not let negative responses from stakeholders in the community affect them (See argument 5/A-3.10: negative community feedback was not considered important if the stakeholders had opposite ideas) and persistently tried to create relationships, gather feedback (See argument 5/A-5.13: being persistent with the local government helped in gaining feedback from stakeholders in the community) and resolve misunderstandings (See argument 5/A-5.15: persistent with community helped resolve misunderstandings).

Meta-Argument 3: the team was overly influenced by community

During the course of community engagement, the team became overly influenced by inputs from the community stakeholders (See argument 5/A-12.19: getting overly influenced by community affected outcomes). The solutions the team proposed satisfied community requirements but did not remain practical or within scope of the project brief, until the sponsors brought this to the team's attention during the interim examination (See argument 5/A-1.15: getting overly influenced by community affected solutions generated during DfSI project and argument 5/A-1.18: interpretation of feedback from community affected the solutions generated during DfSI project).

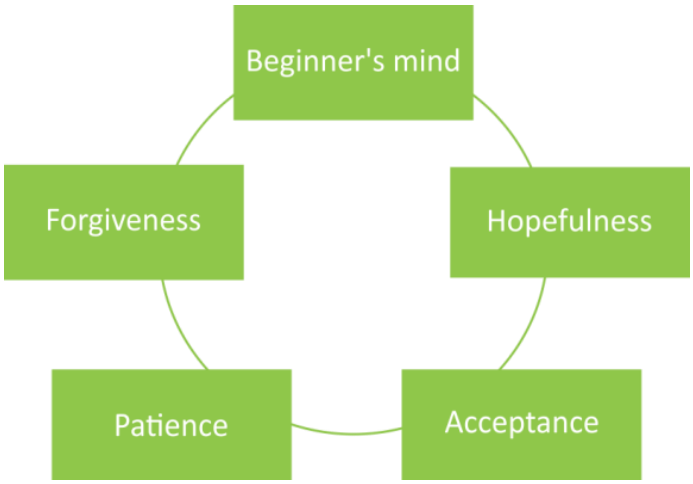
Meta-Argument 4: the team considered part of the community feedback as not relevant

Community engagement remained a source of motivation for the team, and the team ultimately modified their proposals based on their project brief as well as input from the community, which remained an essential part of the final solution proposed by the team (See argument 5/A-10.13: community input provided motivation but did not matter as much as client feedback).

Inner values

The inner value system of team A, as understood from such description of teamwork with regard to input from the community, can be said to show the inner value of, 'beginner's mind' (Q1.16) and 'hopefulness for co-operation' (Q1.16, Q3.11, Q3.12, Q5.15, Q1.18, Q3.10, Q10.13) because they gave importance to input from the community and built their actions accordingly. The team also showed the inner value of, acceptance of the situation (Q1.16, 3.12, Q1.15, Q1.18, Q3.10, Q 12.19), 'patience' (Q5.13, Q5.15) and 'forgiveness' (Q5.13) when the team persistently tried to overcome challenges of involving members and stakeholders from the community and ended with achieving community engagement into their project, visualised as:

Figure 19: Inner values of team A toward community input for effective teamwork during DfSI project



Reflection

The team did a lot of reflecting activities on the input from community members and stakeholders. The team seems to have made extra effort to involve community members and stakeholders into a participatory approach to DfSI project. The involvement of community members and stakeholders in the 'naming', 'framing', 'moving' and 'reflecting' activities may have had a positive and negative effect. Positive effect was better understanding of problem spae and solution space. The negative effect was that solution space emerged keeping community needs in mind while the team did not consider client needs until the sponsors brought this to their notice.

1.5.2 Analysis of team B

Step 3: Making Observation for Subsection 5/B

Participant 6 reflected on the effect of community input on the teamwork during DfSI project of team B and mentioned,

> "*We went to the YMCA, 'cause he knew a lot about the business side, he knew a lot about working with the type of our target audience, which was --Yeah, which was like these teenagers. They're called, like NEETS or something - no income or education or training, or something like that, I don't know. And then yeah, so he helped us sort of know how you disguise education for them, which is what he was doing in his shop thing that they have in Newcastle, so he was really, really helpful, so every time we came back from seeing him it was just like, "Yeah, what ... that makes sense!" Everything he said just made sense so that really influenced the project a lot... Yeah, I felt like I sort of hadn't been thinking of it from a business background, but actually it was. Everything that we were doing was, and it just ... I don't know, it sort of made it a bit more realistic, that what we were thinking about actually needed to connect to something a bit more like. When we'd been coming up with ideas we hadn't really thought about this is a space or an actual thing, we just ... ideas. Yeah, it helped a lot*"[Q6.9]

Step 3.1: Thematic analysis to recognise arguments made

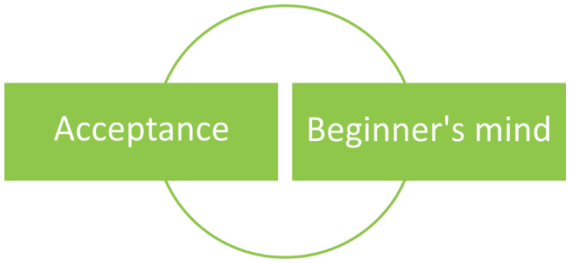
The participant explains how the team engaged community to input their views and can be sais to present the argument that

<u>Argument 5/B-6.9</u>: The team recognised essential stake holders and acquired input

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

The participant mentions "*Yeah, what ... that makes sense!*" and "*made it a bit more realistic*" which can be said to show the inner value of Acceptance. The participant also mentions "*I sort of hadn't been thinking of it from a business background, but actually it was*" which can be said to show the participant let preconception go, which is the inner value of Beginner's mind. Thus, the inner values observed in the quote can be said to be {+A+B}, visualised as:



"*I think we only had about three contact… three times we went to contact members of the community.... So we not, I wouldn't say we had much contact with the community, but just the, when we needed it. Yes. I wouldn't say that it affected our performance, maybe just the content, but not too much*"[Q2.24]

Step 3.1: Thematic analysis to recognise arguments made

The participant explains the extent to which the team involved community and can be said to argue that

<u>Argument 5/B-2.24</u>: contact with community was limited and did not affect the teamwork

The participant can be said to be referring to 'moving' activity of working with community members.

Step 3.2: Applying model of inner values

The participant mentions "*just when we needed it. wouldn't say that it affected our performance*" which can be said to show lack of lack of Hopefulness for co-operation. Thus, the inner values observed in the quote can be said to be {-H}, visualised as:

Participant 6 mentions that,

"*When we went to the schools it was more to validate the ideas, so instead of them helping to generate the ideas, they were helping us validate but they did help because they were saying what would be more realistic, so we proposed a toolkit but then they were saying actually it should be a resource pack and then they described what actually happens in schools 'cause we didn't know, so that sort of changed the direction a little bit, what we were going to do, what we proposed*." [Q6.8]

Step 3.1: Thematic analysis to recognise arguments made

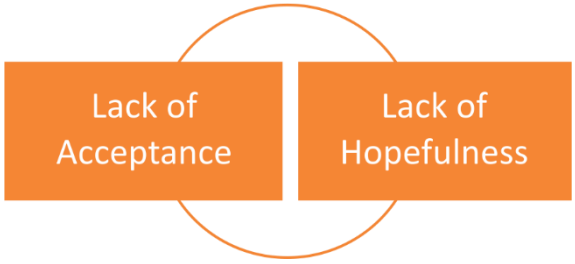
The participant talks about the nature of involvement of the community during their DfSI project and explains that

Argument 5/B-6.8: the community input was used for validation and not for ideation

The participant can be said to be referring to 'reflecting' activity of working with community members.

Step 3.2: Applying model of inner values

The participant mentions "*instead of them helping to generate the ideas, they were helping us validate*" which can be said to show lack of Hopefulness. The participant adds "*they did help*" and "*sort of changed the direction a little bit*" can be said to show the inner value of Acceptance. Thus, the inner values observed in the quote can be said to be {-A-H}, visualised as:



Participant 11 mentioned that,

> "*Yeah, definitely. The community people were interested. But due to internal discussions, time wasted at the centre, we only visited community two times. But I think that was enough. The schools could not provide much information to us anyways. If they had then we could have decided on things much sooner. We just did not give that much importance to them at the time because we had more important, very important internal issue* "[Q11.30]

Step 3.1: Thematic analysis to recognise arguments made

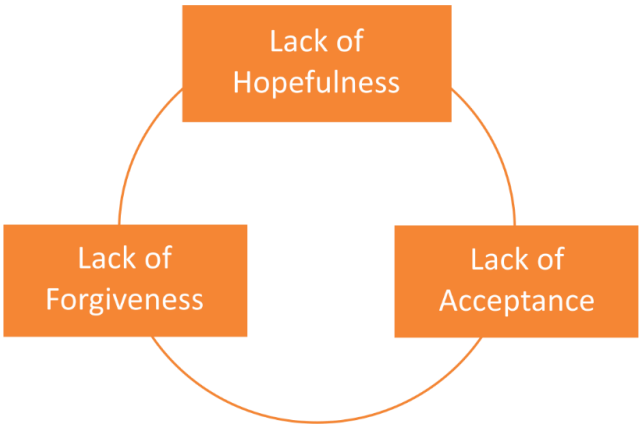
The participant can be said to explain the reason for what the team considered as limited community involvement and can be said to argue that

Argument 5/B-11.30: community input could not be gathered properly due to conflict

The participant can be said to be referring to 'reflecting' activity of working with community members.

Step 3.2: Applying model of inner values

The participant uses phrases such as "*schools could not provide much information to us anyways*" which can be said to show lack of Hopefulness for co-operation. The participant also mentions "*If they had then we could have decided*" which can be said to show lack of Acceptance. The participant repeats the phrase "*important internal issue*" which can be said to show the lack of inner value of Forgiveness. Thus the findings from the quote are:



Step 4: Finding meaning in language for Subsection 5/B

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

Members of team B recognized essential stakeholders to be involved during their DfSI project (See argument 5/B-6.9: The team recognised essential stake holders and acquired input). But this is the only argument making the assertion and needs to be carried forward as meta argument.

The team gathered some feedback on the solutions they had created for the community. Feedback from some of the community stakeholders such as local non-profit organisations and schools helped the team to re-evaluate the solutions that they had proposed and this feedback was used for validation rather than the understanding of problems and ideation of solutions (See argument 5/B-6.8: the community input was used for validation and not for ideation).Thus, input from the community had a limited influence on the solutions proposed by team B (See argument 5/B-2.24: contact with community was limited and did not affect the teamwork).Therefore, the meta argument arising can be said to be that the team did not

consider community feedback which affected the teamwork during DfSI project (Q2.24, Q6.8).

The team's contact with the community was limited because of the delays caused by inter-personal problems and a lack of planning on the part of the team (See argument 5/B-11.30: community input could not be gathered properly due to conflict). This is the only argument making the argument and could be considered as meta argument.

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: essential stakeholders were recognised by the team

Evidentiary quote: Q6.9

Brief summary of findings from thematic analysis: The team engaged certain community members and gathered their input into their project.

Inner value observed in the data: Acceptance (Q6.9) and Beginner's mind (Q6.9)

Evidence: Evidence can be said to show that the team realized the need to involve members from the community and involved them into the project which can be said to show acceptance of the situation that the team faced. Thus, the observation of inner value of Acceptance by applying the proposed model of inner values can be considered valid. Similarly, the inner value of Beginner's mind is required to let go preconceptions and the team's action can be considered as the evidence that the team changed their perspective after gaining new knowledge from the third party organization within the community. Thus, the inner value of Beginner's mind can be considered a valid observation (Q6.9).

Findings: Acceptance (Q6.9) and Beginner's mind (Q6.9) are recognised as the inner values of the team.

Meta-Argument 2: the team did not consider community feedback which affects the teamwork during DfSI project

Evidentiary quote: Q2.24, Q6.8

Brief summary of findings from thematic analysis: The team involved community in limited manner than they hoped for and this affected their teamwork.

Inner value observed in the data: lack of inner value of Hopefulness (Q2.24, Q6.8) and inner value of Acceptance (Q6.8)

Evidence: The team did not approach community early on into the project because of multiple reasons, one of which can be considered as lack of hope for co-operation or

lack of hope that input from community would be important. This may not be the only reason or even one of the major reasons, but can be considered a factor affecting the team's decision. The team did accept the need to get community feedback on ideas that the team had come up with and showed the wisdom for changing the situation that the team was in. Thus the inner values observed by applying the proposed model of inner values can be considered valid.

Findings: Lack of inner value of Hopefulness (Q2.24, Q6.8) and inner value of Acceptance (Q6.8) are inner values recognised for the team.

Meta-Argument 3: the team could not gather the community input due to internal conflicts

Evidentiary quote: Q11.30

Brief summary of findings from thematic analysis: The internal dynamics within the team played as an important factor for the team not being able to involve community stakeholders early on into the project.

Inner value observed in the data: lack of inner value of Hopefulness (Q11.30), the inner value of lack of Acceptance (11.30), lack of Forgiveness (Q11.30)

Evidence: Evidence can be said to show that the input from the community was not considered as urgent and therefore never sought by the team early into the project. Thus, the observation of lack of inner value of Hopefulness for co-operation can be said to be valid for team B in that respect (Q11.30). Evidence further can be said to show that the team could not accept the importance of involving the community or understanding the internal dynamics of their team and showing wisdom to change it (Q11.30). The inner value of Forgiveness is required to let go the non-co-operation from the team and continues with co-operation within and outside the team. Evidence can be said to show that the team could not move past the conflict to gather input from the community (Q11.30). Thus, the observation from applying the proposed model of inner values can be considered valid.

Findings: Lack of inner value of Hopefulness (Q11.30), lack of Acceptance (11.30) and lack of Forgiveness (Q11.30) are considered as valid observations as the inner value of the team.

Summarization of Findings and observation for subsection 5/B

Thematic analysis

Meta-Argument 1: Essential stakeholders were recognised by the team.

Members of team B recognized essential stakeholders to be involved during their DfSI project (See argument 5/B-6.9: The team recognised essential stake holders and acquired input).

Meta-Argument 2: The team did not consider community feedback which affects the teamwork during DfSI project.

The team gathered some feedback on the solutions they had created for the community. Feedback from some of the community stakeholders such as local non-profit organisations and schools helped the team to re-evaluate the solutions that they had proposed and this feedback was used for validation rather than the understanding of problems and ideation of solutions (See argument 5/B-6.8: the community input was used for validation and not for ideation).Thus, input from the community had a limited influence on the solutions proposed by team B (See argument 5/B-2.24: contact with community was limited and did not affect the teamwork).

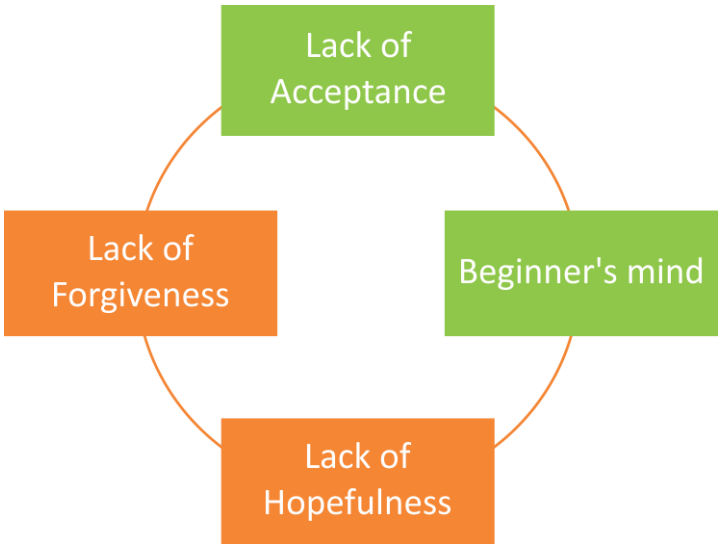
Meta-Argument 3: The team could not gather the community input due to internal conflicts.

The team's contact with the community was limited because of the delays caused by inter-personal problems and a lack of planning on the part of the team (See argument 5/B-11.30: community input could not be gathered properly due to conflict).

Inner values

The inner values of team B derive from the explanation of teamwork with regard to input from community stakeholders. Team B appear to have the inner value of, 'acceptance of the situation' (Q6.9, Q6.8) because they sought alternative ways to develop their understanding about the project when the team could not meet the community stakeholders, due to problems within their team. The team showed the inner value of, 'beginner's mind' (Q6.9) when integrating feedback from the community stakeholders, who reviewed their proposed solutions. However, the team also lost the inner value of, 'hopefulness for co-operation' (Q2.24, Q6.8, Q11.30) and may have lacked, 'forgiveness' (Q11.30) because they could not overcome internal problems for community engagement.

Figure 20: Inner values of team B toward community input for effective teamwork during DfSI project



Reflection

The team could not gather input from the community during 'naming', 'framing' and most of the 'moving' activities. This may be because members could not agree on a strategy and were delayed due to inter-personal conflict, which distracted the team. The members involved stakeholders from the community to review the ideas and solution they had created, which was a 'reflecting' activity, and helped the team to re-structure some of their earlier assumptions and revise some of their solutions. However, as reported by team B, the community participation during their project can be said to be limited to reviewing ideas rather than understanding problem and generating solutions.

1.5.3 Analysis of team C

Step 3: Making Observation for Subsection 5/C

> "*So you've got a ticket, you're not happy with the ticket, you can appeal, and that's what we, I came to. That was but that was, I think two weeks before or three weeks before --It wasn't in the court, but it was sort of like that, you've got like judge, like that. Because it finally came, it finally became real, like, "Oh, yeah, people do experience this stuff", instead of just a project. Like, "Oh yeah, people got tickets" and stuff, and it becomes more ... it's a reality that people do get tickets for serious stuff.*"[Q9.8]

Step 3.1: Thematic analysis to recognise arguments made

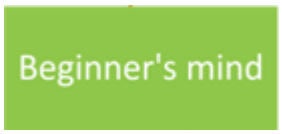
The participant can be said to argue that

<u>Argument 5/C-9.8</u>: watching the community of users helped understand the problem better

The participant can be said to be referring to 'reflecting' activity of working with community members.

Step 3.2: Applying model of inner values

The participant uses phrases such as "*people do experience this stuff... it's reality*" which can be said to show the preconceptions of participant changed which is the inner value of Beginner's mind. Thus, the inner values observed in the quote can be said to be {B}, visualised as:



> *"Not really. We got in touch with the clothing ... the people that make the uniforms. We didn't get in contact with the parking association or anything like that... We researched different organisations and different initiatives and things like that. We didn't get in contact with any of them.... I think it might have been beneficial in terms of giving us background knowledge, 'cause when we went to the presentation there was one ... He worked for the transport ... I don't know what it was, the transport section of some council in Hove, Brighton and Hove or something, and some of the social media stuff they'd just started doing already, so that might have been useful for us to talk to, find out what they're doing and what the reaction is to that, 'cause that could have supported us in our concepts, or affected them. What we did was co-design with stakeholders and the key personnel that had vision of the project"* [Q4.21]

Step 3.1: Thematic analysis to recognise arguments made

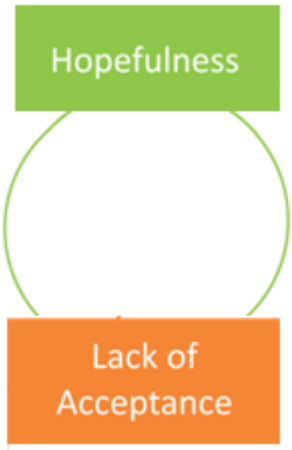
The participant can be said to present the argument that

Argument 2/C-7.12: Community input was not sought but stakeholders were used to understand problem and develop solutions.

The participant can be said to be referring to 'reflecting' activity of working with community members.

Step 3.2: Applying model of inner values

The participant mentions "*might have been beneficial in terms of giving us background knowledge*" and "*that could have supported us in our concepts, or affected them*" which can be said to show the participant is thinking wishfully, which can be said to show the lack of inner value of Acceptance. But such behaviour can also be said to indicate inner value of Hopefulness for co-operation. Thus, the inner values observed in the quote can be said to be {-A}, visualised as:



Step 4: Finding meaning in language for Subsection 5/c

Step 4.1: Combining arguments from thematic analysis to create meta-arguments

Members of team C had input from community stakeholders throughout the project. Initial observation of the parking procedures followed by the community input, provided a better understanding of the project (See argument 5/C-9.8).The team then used community engagement and stakeholder engagement for understanding problems and creating solutions with the people that the team was designing for. Thus, the meta argument made could be said to be that observing the parking procedures followed by the community provided a better understanding the project (Q9.8).

The team could not gather feedback from community members after the ideas were refined by the team because feedback from stakeholders such as the client and the Parking department was given more importance (See argument 5/C-4.21). Thus the meta argument could be that the team did not consider community input which affects the teamwork during DfSI project (Q4.21).

Step 4.2: Combining observations from model of inner values with meta arguments from thematic analysis

Meta-Argument 1: Observing the parking procedures followed by the community provided a better understanding the project

Evidentiary quote: Q9.8

Brief summary of findings from thematic analysis: The team initially gathered community views by observing real world implications of their project/ their topic.

Inner value observed in the data: Beginner's mind (Q9.8)

Evidence: Perspective shift after having contact with the community demonstrates that team had beginner's mind. The extent of the effect of community on the team's working is not clear but it is enough to validate the observation made by applying the proposed model of inner values.

Findings: Beginner's mind is a weak observation for the team (Q9.8) and can be refuted with stronger evidence.

Meta-Argument 2: The team did not consider community input after the project outcomes were created

Evidentiary quote: Q4.21

Brief summary of findings from thematic analysis: The team created solutions with the stakeholders and community members but the implications of such solutions could not be studied.

Inner value observed in the data: lack of inner value of Acceptance and Hopefulness for co-operation (Q4.21)

Evidence: The inner value of Acceptance was explained by the experts as wisdom to accept limitation and accept that change was needed. Evidence can be said to show that the team members wished they had collected and assimilated input from the community after the solutions were generated (Q4.21). However, the community was used to develop the ideas during DfSI project and therefore, the observation is a reflection after

the interview and cannot be said to affect teamwork during the DfSI project. On the other hand, Hopefulness for co-operation can be said to have affected the team.

Findings: The observation of lack of Acceptance is not a valid observation but Hopefulness for co-operation is valid observation for the team.

Summarization of Findings and observation for subsection 5/C

Thematic analysis

Meta-Argument 1: Observing the parking procedures followed by the community provided a better understanding the project.

Members of team C had input from community stakeholders throughout the project. Initial observation of the parking procedures followed by the community input, provided a better understanding of the project(See argument 5/C-9.8).The team then used community engagement and stakeholder engagement for understanding problems and creating solutions with the people that the team was designing for.

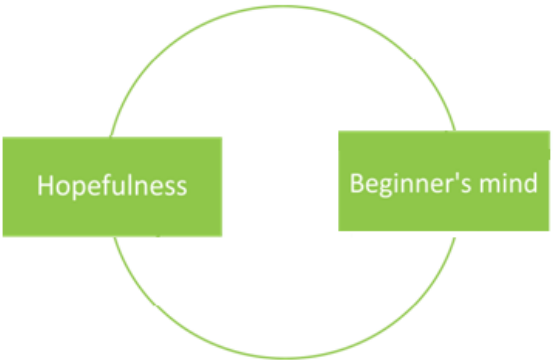
Meta-Argument 2: The team did not consider community input after the project outcomes were created.

The team could not gather feedback from community members after the ideas were refined by the team because feedback from stakeholders such as the client and the Parking department was given more importance (See argument 5/C-4.21).

Inner values

The inner values of team C are derived from the explanation of teamwork. The team showed the inner value of, 'beginner's mind' (Q9.8) and 'hopefulness for co-operation' (Q4.21) because they employed community engagement heavily during their DfSI project. Thus, the inner value system can be visualised as: +B+H

Figure 21:: Inner values of team C toward community input for effective teamwork during DfSI project



Reflection

The team collected information from stakeholders which was considered sensitive and the team did not use information collected directly from community after solutions were developed. Team C can be said to utilise a participatory approach to involve community stakeholders in their ‘naming’, ‘framing’ and ‘moving’ activities.

Appendix 2 : Participant Information Sheet

PARTICIPANT INFORMATION SHEET.

Title: Effects of awareness based technique on co-creation process

Researcher: Pratik Vyas

Email: p.vyas@northumbria.ac.uk

Supervisor: Prof. Robert Young

Email: robert.young@northumbria.ac.uk

Research conducted at:

School of Design,
Northumbria University,
Newcastle upon Tyne,
UK
NE1 8ST

INFORMATION TO POTENTIAL PARTICIPANTS
1. What is the purpose of the project? Social Innovation projects in Design demand designing with people instead of designing for people (Whiteley, 1993; Lawson, 2004). This process of designing with people, also termed as co-creation (Papanek, 1982; Hartley, 1990; Whiteley, 1993; Prahalad and Ramaswamy, 2004; Plattner, Meinel and Leifer, 2012) can be a stressful process for the design team and this affects the nature and outcome of the co-creation process. The aim of this research is to study the physiological, psychological and sociological effects of awareness based practices on participants co-creating in a social innovation project.
2. Why have I been selected to take part? You have shown interest in understanding and applying the technique of awareness based practice while working on your social innovation project. It is pertinent that we gather data during and after your project work.
3. What will I have to do? One week before your social innovation project begins, you will get an opportunity to learn about awareness-based techniques by Dr. Bisong Guo[30]. You will also be issued with a unique user identifier and password to enable your access to the guided audio

[30] Dr. Bisong Guo is WHO consultant and registered GP in Scotland. She is Doctor of Chinese medicine, Acupunture and Meditation. She is also co-author of the book "Listen to Your Body".

three minute meditation from www.presentandaware.net . Your programme tutor will notify you of the arrangements for the session with Dr Bisong. On this day 'pre-project HRV' and 'pre-project MAAS' data will be collected. HRV stands for Heart Rate Variability and is an indicator of physiological stress. It will be measured using a strap on device that you will attach on your chest and data will be collected for 5 minutes. MAAS stands for Mindfulness and Awareness Scale and it is a questionnaire to study perceptions. It requires roughly 3 to 4 minutes to complete the questionnaire. The total time estimated for this data collection is 15 minutes.

Once your Social Innovation Project begins, video recording will be done of your weekly group meeting in the university. The recording will be done while you are working with your team and at your usual place of discussion. The recordings will use 2 video cameras (Sony handycams) and an audio device in the centre of the room.

One week after the completion of the project you will be invited for a debriefing interview session at Northumbria University. This session will be set up in a space to ensure privacy. During this session 'post-project' HRV data and MAAS data will be collected. The HRV data (Electro Cardio Gram) will be collected using PowerLab (a portable version of ECG machines used in hospitals) before the interview begins. This machine is a wired device and these wires will be placed on your wrists and left ankle either by the researcher or by yourself under direction, if you prefer. They will be placed using stick-on electrodes and you will be provided with alcoholic wipes to clean them off after the data collection. Please ask the interviewer for a demonstration of the device if you have any doubts. The interview will be a reflective process over the co-creation process. You may be shown certain video clips of events recorded during your project, to aid your reflection process. During this session, the previously collected data pertaining to you will be used for reflection as well eg. Physiological stress levels from HRV data or changes in perception from MAAS data.

It is up to you to decide whether or not to take part. If you do decide to take part after reading this information sheet then you will be asked to sign a consent form and you can still withdraw at any time without it affecting any benefits that you are entitled to in any way. You do not have to give a reason. You have the right to ask that any data you have supplied to that point be withdrawn/destroyed on the grounds of Data being Confidential, Data being of Private Nature and/or Data is not relevant to the study. You have the right to omit or refuse to answer or respond to any question that is asked of you (as appropriate, "and without penalty").

You have the right to have your questions about the procedures answered (unless answering these questions would interfere with the study's outcome). If you have any questions as a result of reading this information sheet, you can ask the researcher at p.vyas@northumbria.ac.uk .

4. What are the exclusion criteria (i.e. are there any reasons why I should not take part)?

This study looks at Social Innovation Projects where a team of 4 to 8 members work towards designing with people rather than for them. There are no other exclusion criteria for this study. All members of the team must be happy to be involved in this study of the team's project work.

5. Will my participation involve any physical discomfort?

HRV data when collected using PowerLab may seem intrusive but it records the same type of data that the self-administered HRV using the chest strap provides, that many sports people now use to improve their performance. However, PowerLab records the data using an increased number of monitor points, with a greater precision of frequency to assist fine analysis. Please note that HRV tests are very common tests in health, sport and wellbeing projects and there are no risks involved to the participant in the process.

6. Will my participation involve any psychological discomfort or embarrassment?

During video recording, if you feel any psychological discomfort e.g. the nature of data being discussed is of personal or confidential nature, or any other reason, then please note that you have right to withdraw at any time. If you want to remain part of the study but have a particular team meeting session withdrawn, then that is your prerogative.

7. Will I have to provide any bodily samples (i.e. blood, saliva)?

No. You do not have to provide any bodily samples.

8. How will confidentiality be assured?

To ensure confidentiality and anonymity of the data being collected, the following steps will be taken:

- Any data collected or transcribed will be made anonymous using a code so that no one can link the data that you provided to your personal details.
- The data collected will be stored securely on a hard disc and will be used solely for the purpose of this study.
- This data will not be shared or used in any other study. The data will be destroyed at the end of this research.
- Analyzed information from this study will not reveal any personal information either in the thesis or in any presentation at conferences, publication, etc.

9. Who will have access to the information that I provide?

The information that you provide will be anonymised and stored in a confidential and secure database. The data will be analyzed and the outcomes generated from this analysis will be generalized before appearing in the PhD thesis of Pratik Vyas. Therefore the outcomes will not be capable of being identified in relation to a particular participant of the study.
Email: p.vyas@northumbria.ac.uk
Or by contacting
School of Design, Northumbria University.
Email: mark.grant@northumbria.ac.uk

10. How will my information be stored / used in the future?

The information collected during this research will be stored in line with the Data Protection Act on a personal hard disk that is password protected, in anonymous form. The stored data will be analysed during the course of this PhD by the researcher. Once

the purpose of this study has been accomplished, the data will be destroyed.

11. Has this investigation received appropriate ethical clearance?

Yes. This investigation has approved ethical clearance from the Design Department Ethics Committee at Northumbria University, with advice from the Dept. of Life Sciences Ethics Committee at Northumbria University, including specialists in HRV research methods Dr. Laurie Rauch.

12. Will I receive any financial rewards / travel expenses for taking part?

This study provides you with an opportunity to learn meditation techniques from Dr. Bisong Guo, a world renowned Qi Gong Master and a leading figure in Mind Body Heart study. This study also provides you with an opportunity to learn physiology from Dr. Laurie Rauch, one of the leading physiologist in Sports Science in Cape Town University.

Please note that your participation is voluntary and <u>No financial awards</u> have been allocated for participating in this study.

13. How can I withdraw from the project?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep (and be asked to sign a consent form) and you can still withdraw at any time. You do not have to give a reason.

You have the right to ask that any data you have supplied to that point be withdrawn/destroyed.

You have the right to omit or refuse to answer or respond to any question that is asked of you (as appropriate, "and without prejudice").

You have the right to have your questions about the procedures answered (unless answering these questions would interfere with the study's outcome). If you have any questions as a result of reading this information sheet, you should ask the researcher.

The research you will take part in will be most valuable if few people withdraw from it, so please discuss any concerns you might have with the researchers. During the study itself, if you do decide that you do not wish to take any further part then please inform the researcher as soon as possible, and they will facilitate your withdrawal and discuss with you how you would like your data to be treated in the future.

After you have completed the research you can still withdraw your data by contacting the researcher on: p.vyas@northumbria.ac.uk. If, for any reason, you wish to withdraw your data after the research, please contact the investigator within a month of your participation. After this date, it may not be possible to withdraw your individual data as the results may already have been published. As all data are made anonymous, your individual data will not be capable of being identified in any way.

14. If I require further information who should I contact and how?

I will be glad to answer your questions about this study at any time. You may contact

me at p.vyas@northumbria.ac.uk

Or Call on +44-7889532880

Or write to us at:

Centre for Design Research (CfDR),
2nd Floor School of Design,
University of Northumbria,
Newcastle upon Tyne.
NE1 8ST

If you want to find out about the final results of this study, you should contact the School of Design at the address above and inquire about the PhD Thesis of Pratik Vyas.

Appendix 3 : MAAS questionnaire

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6
I drive places on 'automatic pilot' and then wonder why I went there.	1	2	3	4	5	6
I find myself preoccupied with the future or the past.	1	2	3	4	5	6
I find myself doing things without paying attention.	1	2	3	4	5	6
I snack without being aware that I'm eating.	1	2	3	4	5	6

Appendix 4 : Inter-rater reliability-A supportive study

Introduction

This research studies the 'Team Work during Design for Social Innovation (DfSI) projects'. This document has been developed to gain assistance from expert design researchers (tenured research active post-doc academics who are not classified as a vulnerable adult).This study is designed to verify that the method of qualitative analysis is replicable and reliable, and I have been recommended to approach you as someone who could give this kind of expert feedback. The average time investment is upto 30 minutes divided as follows:

- Reading Section 1 and understanding the process of analysis: 10 minutes
- Applying the process of analysis on an exemplar in Section 2: 10 to 15 minutes
- Commenting on the analysis process and providing feedback in Section 3: 5 minutes

If you fulfil selection criteria and are willing to participate, could you please enter your name and designation below to provide consent. Please note these details will not be revealed and your personal details will remain confidential. Any doubts please contact the researcher Pratik Vyas at: p.vyas@northumbria.ac.uk

Name: _____ Designation:_____

Signature:_____ (reply sent by email will be considered as permission)

The steps of Analysis

This research has taken a pragmatic approach to understanding design and growth of professional practice that designers achieve through reflective practice (Schön, 1983). The process of analysis has three steps:

Step 1: Identify argument and theme: This step brings out meaning from the argument presented in a quote. Usually, this may entail recognizing the sentences/phrases within the quote which reveal one or more arguments or explanations of design activity undertaken by a participant. *This step in the study will help to compare expert's views with the views of the researcher in understanding what argument is drawn from the data*.

Step 2A: Identify the context in terms of design activities, as defined by Valkenburg and Dorst (1998), whose explanation is rooted in Schön's Reflective practitioner approach. *This step will compare the views of expert to those of the researcher in understanding which design activity is a participant referring to*.

Step 2B: Apply the proposed model shown in table 1 to classify the quote from a participant in terms of the inner values that may exist or be lacking. *This step compares expert's views*

on what inner value system does a participant reveal, with those of the researcher of this study.

The theory for steps 2A and 2B are briefly explained below.

Valkenburg and Dorst's (1998) interpretation of design activities

Valkenburg and Dorst (1998) proposed a method that overcomes the criticism of subjective interpretation that ails participatory methods. Their method has been developed to evaluate the design process applied by teams and uses a set of criteria derived from Schön's 'reflection in action' (Schön, 1983) as an evaluation technique. The protocol for identifying the four activities as explained and used by Valkenburg and Dorst (1998) is as follows:

Naming: Any action recognizing objectives by revisiting the expectations from the design brief of the client, lets the team move forward and this process of designing has been called a *naming* activity. Thus, when the team members point out the parts of the design brief or try to determine relevant objectives, this is coded as a *naming* activity.

Framing: framing activity is where the team members set a 'context' for looking at a problem space or solution space, where a frame is "*something to hold onto and to focus on while designing*" (Ibid, 1998 p.255).Valkenburg and Dorst (1998) recognize framing activities when team members form strategies for further design activities that let the team ideate. They explain framing is where further activities occur and therefore visualise it as a box within which moving and reflecting occur. Thus, planning a project, sharing responsibility or any other activity that lets the project become organized for successful execution of core designing can be considered as a *framing* activity.

Moving: When the members of a team, progress towards experimentation to create a set of ideas by sorting information, creating solutions and combining ideas, this can be identified as a *moving* activity. Such activities not only create ideas, but also identify the suitability of the frame. Therefore, the activity of moving is characterised by a verb. But it is also important to recognize the correct context in which ideas are being generated.

Reflecting: When the team members assess the validity of an earlier activity to determine the next steps, it can be coded as reflection. The reflecting activity is not only about ideas, but the process, the actions, the decisions and the plans made in the past. Such reflection may include a review of one's own actions and behaviour while applying the process of design.

Analysis using proposed model

This research looks at the inner values of designers working in teams during design for social innovation (DfSI) projects. Qualitative data was collected from participants who had worked on social innovation projects for eight weeks as part of their study on the Multidisciplinary Design Innovation Postgraduate programme (MDI). During post project interviews participants answered questions on different aspects of their teamwork during the DfSI project. These interviews were transcribed and the transcripts have been anonymised. A

process of analysis has been devised based on a review of the literature on teamwork, design for social innovation, positive psychology and design research methods. Literature revealed that certain inner values, [also called “Character Strengths” (Peterson and Seligman, 2004), “Governing Variables” (Argyris and Schön, 1974) and “Virtues” (Schwartz, 2009)] may affect teamwork during DfSI projects. Based on a survey done with 30 expert design practitioners this was confirmed. Using positive psychology, the list of inner values is made into a model of inner values (shown in table 1) that could help understand teamwork during DfSI projects by the way in which participants have articulated their response to interview questions.

Table 1: The inner values for successful co-design

Name of Inner Value	Definition of Inner Value	How to recognize if the 'Inner Value' exists in transcripts?	How to recognize if a 'lack of the Inner Value' exists in transcripts?
Hopefulness for co-operation	Hopefulness for co-operation is the intention that the first moves from both parties will be towards co-operation (Nowak and Highfield, 2011).	The participants say keywords/phrases that would indicate the intention to co-operate with at least one stakeholder, team member or the client as their first move. E.g. collaborate, co-operate, equal opportunity, include (others) in the process (project activity) etc.	The participants say keywords that would indicate a lack of intention to co-create with a stakeholder, a team member or a client e.g. (input from a stakeholder) did not matter to us/me, no need (for input from a stakeholder), they (stakeholder's/team members) ignored input (from other stakeholder/team members) etc.
Generosity	Generosity is the ability to accept a smaller share of benefit that arises from co-operation (Nowak and Highfield, 2011).	The participant's language would indicate an intention to make a compromise for the greater good e.g. I/we decided to get on with it (the task at hand) or accepted it (team decision) so as to save time etc	The participant's language would show an intention of not accepting a lesser share, or not compromising. E.g. I like it (task) this way but they (team/stakeholder) wouldn't' listen so we kept pushing until they did. For similar reasons if a participant chooses to be silent, or withdraw participation then these are also examples of a lack of Generosity of spirit.
Forgiveness	Forgiveness is the ability to reciprocate defection with co-operation in the subsequent interaction (Nowak and Highfield, 2011).	The participant's language would show an intention not to assign blame for an event that occurred during the project. e.g.; "it happens", "no one's fault" etc., to show a forgiving attitude.	The participant's language would show an intention of assigning blame for an event during the project to a person or people. e.g.: Repetition of negative language to describe the same incidence shows a non-forgiving attitude. Reflections by participants on the outcomes of an incident have negative language, e.g.: "it was crap" or if the participant blames someone for an outcome by saying "it was avoidable" also indicates a lack of forgiveness.
Patience	Patience as an inner value is not to interrupt or react before letting an occurring event unfold completely (Grossman, 2011).	The participant's language would show an intention not to interrupt or react before letting the event unfold completely. E.g. We/I kept on trying to understand. We continued to make contact etc.	The participant's language would show an intention of interruption or reacting before letting the event unfold completely. E.g. it (an event) was happening and I couldn't take it anymore, It felt like ages, I couldn't' be bothered after a while, it takes too long etc.
Acceptance	Acceptance is experiencing events fully and without defence, as they are (Hayes, 1994, p. 30).	The participant's language would show an intention of experiencing the event without defence. E.g., it happened but none could have done otherwise etc.	The participant's language would show an intention of experiencing the event with defences. E.g. It (event/action/reaction) shouldn't have happened this way etc. Wishing and hoping things were different or happened differently is an example of lack of Acceptance.
Non-judgmental	Being Non-judgmental is the action of describing the facts objectively, and not thinking about 'good' or 'bad', 'fair' or 'unfair'. Judgments encapsulate feelings about the situation, are irrational and cannot be explained. (Dreyfus, 2011, pg.53).	By definition chosen for this research Non-judgmental behaviour can be observed when participant is describing the facts, and not thinking about 'good' or 'bad', 'fair' or 'unfair'. E.g. participant mentions an incidence with certain difficulties as just fact.	The participant would show the intention of categorizing a person/people in a certain way. E.g. I think, everyone is this (certain) way, they (stakeholder/team member/client) are like that (certain way) etc. Thus, generalizations by participants can be the first clue to recognising Judgemental behaviour.
Beginner's mind	Beginner's mind is relinquishing control over a particular thought or idea or preconception (Deraz, Varela and Vermersch, 2000)	The participant would show the intention of relinquishing control over a thought or idea e.g. I thought that but it wasn't that way (positive remark)	The participant would show the intention of not relinquishing control over a thought or idea e.g. That's what people are used to, that's how they (stakeholder/team member/client) are etc.

An example of process of analysis

Step 1: Selecting Quotes from transcript:	**Step 2**: Identify argument and theme:

<table>
<tr><td>"It's probably better having people who have radical ideas and solutions to the problem. I mean with same discipline maybe we would have understood each other better and maybe been able to work more efficiently. But I think for the work place in the future, you can't choose who you are working with, it's great sort of practice for that really"</td><td><u>Argument</u>- The diversity of skills provided a learning opportunity
<u>Theme</u>- multidisciplinary team structure</td></tr>
<tr><td colspan="2"><u>Step 3A</u>: Valkenburg and Dorst's four activity model: The use of the phrase "Certainly in a work place, you have to get on with whoever you work with really. So this is like a good practice, to get to know new people, different people and get along with them and work with them". Such an activity may be coded as 'reflecting', because it directly relates to past activity being used for betterment of future activities. This was on the participant's mind during the project and thus, it can be said the participant was reflecting.</td></tr>
<tr><td colspan="2"><u>Step 3B</u>: Determining the inner values:<table><tr><td><u>Inner value</u></td><td><u>Evidence</u></td></tr><tr><td>Hopefulness for co-operation</td><td>"It's probably better having people who have radical ideas"</td></tr></table></td></tr>
</table>

The above example can be said to show how a quote is broken down in different ways, firstly for thematic analysis, then to recognize design activities as defined by Valkenburg and Dorst's and finally to apply the model of inner values proposed in table 1.

It would be greatly appreciated if you could use your understanding of this method to analyse the two-page exemplar selected from the data set presented in section 2 below. Following this, could you please provide, in section 3, your reflection on the process of analysis and how it could be improved within the context of this research.

<u>Please note: it is your reflection on the process of analysis that is of value to this check of inter-rater reliability, not your specific analysis of the data set.</u>

References

Valkenburg, R., & Dorst, K. (1998). The reflective practice of design teams. *Design studies*, *19*(3), 249-271. Elsevier.
Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books. ISBN 978-0-465-06874-6
Argyris, C. & Schön, D. (1974). *Theory in practice: Increasing professional effectiveness*. Jossey-Bass.
Peterson, C. & Seligman, M. E. (2004). *Character strengths and virtues: A handbook and classification*. Oxford University Press.
Schwartz, S. H. (2009). Basic human values. *sociologie*, *42*, 249-288

Please try to analyse the exemplar below.

The quotes below are from two different participants on two different topics after working as part of multi-disciplinary team working on Design for Social Innovation (DfSI) project. Can you recognise the theme of the quote, context of design activities based on Valkenburg and Dorst's explanation and inner values based on the proposed framework?

R – So yeah, like with regards to your team, how would you compare your team – or an MDI team – with the team of your discipline that is business?

P3 – *The thing is that the strength here is that all the different disciplines are coming together and they contribute in the way that we won't be able to contribute. So it's like an exchange of the skills and they would be responsible for things that we won't, you know, be able to help much. So, it all depends on what kind of project - if all those skills are really necessary to work on this project. For example, they need to have everything planned. And maybe that's why we were quite like organised and, you know, everything was, we knew like within a week what we are doing and what time and what's happening and what outcomes are supposed to be of our actions. So, I think in terms of that it was quite helpful for the project. Like, this kind of approach that everything, you know, was organised. Because I think within design students it won't be possible. These people I think they are more, they are not organised. They cannot, you know, like plan maybe that they were like precisely. Designers were like, all the aspects, you know, of like kind of creativity and all the visual side of it possibly. And because while we are working we could see all the propositions that others like, I mean business of engineering students, they are giving, they, you know, it's not exact, you know, like nothing like imaginative - it's nothing new. So, definitely the creativity.*

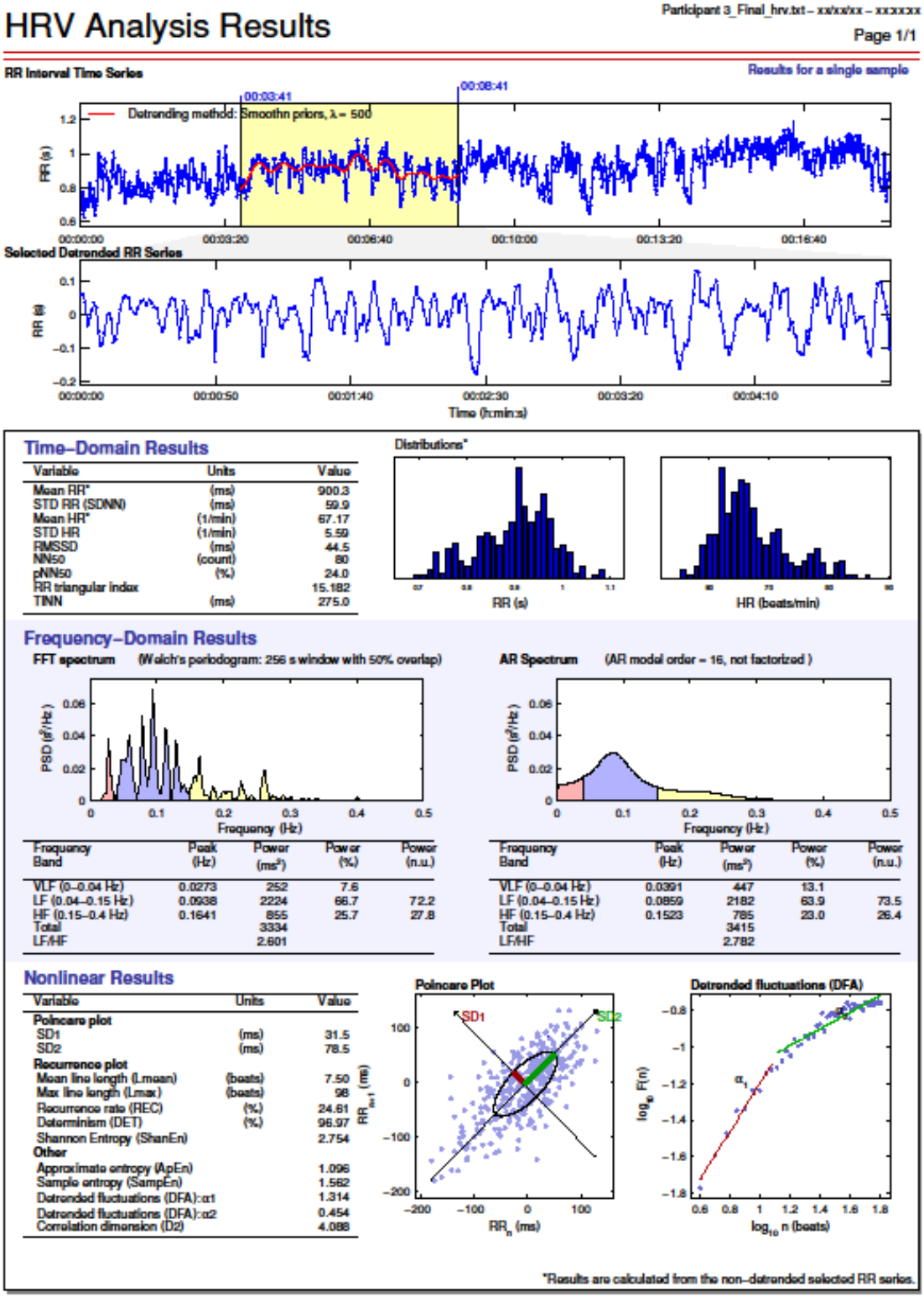
R – Yeah. So when you say like other people, people aren't the strongest from their background. So how much does a person's roots into his own background or his own sector matter?

P1 – *I think that it really does. I think that, well I've had this discussion with Name a few times and different lecturers. I think a lot of people are here just for the sake of doing a Masters. I don't think that they necessarily have the skills and desire to get a decent grade. And I think that really affects the level of input put into a project. I think that you need to understand your discipline to a point where if someone asks you a question about it, you can answer it within, well either straightway or within doing a short amount of research. You shouldn't have to go away for weeks on end and then come back with minimal effort. I think that understanding your discipline is really, really important for team work definitely.*

Section 3: Reflection on process of analysis

Please could you provide your reflection on the process of analysis, its application on data set, ways to improve it and any strengths you perceive this method may have.

Appendix 5 : A sample of HRV analysis using Kubios software



Appendix 6 Survey questionnaire

Participant Information Sheet for Informed Consent

Why is this survey conducted?

The aim of this survey is to verify whether, using opinions from experts, that 'the inner values identified from literature are important during team work in design for social innovation'. Definitions of key terminologies are provided below to help you understand the context of this research survey.

> **Inner values**... are intrinsic worth assigned to thoughts or ideas forming an unconscious value priority. Inner values arouse feelings but are not bound by them and have also been called character strengths, virtues (Peterson and Seligman, 2004) or moral guides, ethical scales, quality indicators (Schwartz, 2006). The use of the term inner values here indicates characteristics derived from literature that may be beneficial to designers and should not be confused with the value generated by designing.
>
> **Design** is... "*the purposeful activity initiated by the recognition of a perceived problem or opportunity, which through the application of energy, skill and resources leads to re-arranging the reality, set against a particular contextual backdrop of broader change, so that the changes facilitate value and benefit to an identifiable quantity of people who come into contact with the changes*" (Spencer, 2008).
>
> **Social innovations** are... "*Innovations that are social in both their ends and means. Specifically we define social innovations as new ideas (products, services and models) that simultaneously meet social needs… and create new social relationships or collaborations. They are innovations that are not only good for society but enhance society's capacity to act*" (Board of European Policy Advisors in Hubert, 2010).

Your opinion as an expert is being sought to identify and shortlist appropriate inner values in this context. It is important to note that the list of inner values is not exhaustive and one or many inner values may act together at same time in any given situation (Schwartz, 2006).

Who can participate?

You should be an adult, above the age of 18 years, not categorized as vulnerable according to Mental Capacity Act 2005 (please check if you are categorised as vulnerable at the following web link: http://www.legislation.gov.uk/ukpga/2005/9/section/2). You should agree to the use of data that you are providing and the associated confidentiality. Further, you should have experience and expertise of team work in the field of Design for Social Innovation either as a practitioner or academic. You should be able to declare your level and nature of experience in the given fields below and should respond to every question asked in the survey completely and truthfully. Please note that any incomplete surveys will not be considered for analysis.

Your rights as a participant

As a participant, you have the right to be fully informed. Please ask any questions and clarify any doubts regarding this research and the survey being conducted to the researcher- Pratik

Vyas at p.vyas@northumbria.ac.uk. However, it would be appreciated if you could provide your objective opinions before understanding the details of the entire research.

You have the right to confidentiality, which will be provided by anonymising your response before statistical analysis is conducted. Your personal information will not be shared or made public through any publications (including doctoral thesis). Your number of years of experience may be shared with examiners of the doctoral thesis but only if requested. The data will be stored securely encrypted on Northumbria university system and will be password protected. Any printed copies will be stored in locked cabinet until they are ready to be shredded after digitization on encrypted university drive which is password protected. All data will be shredded or securely deleted using CCleaner, Shredder or Eraser after analysis expected to finish by June 2017. It is considered ethical to allow access to the actual results of the research, rather than just the transcripts of the interviews. Therefore, you will be provided with access to the actual results of the research in the form of a paper/draft chapter, in order to enable you to understand and see how the information provided was used and what your contribution to the project is.

You have a right to withdraw the information you provide, partially or completely, and modify your answers after retrospection. It is requested that, should you choose to withdraw your participation, if you could please do so in the first month after submitting your response because the data would be analysed after a month from when you provide your response. You would not require providing reason for any modification or withdrawal of participation if it is done within one month (30 days) from the date you provide your response. However, you have the right to request partial or complete withdrawal of participation after the first month, but you would need to provide a reason for withdrawal (such as, a request for withdrawal of participation due to erroneous data provided).The Researcher will utilise the Northumbria University Ethics Guide and discretion to remove the data from analysis after one month.

Structure of the survey

The survey is divided into four sections. First question provides Participant Information Sheet for Informed Consent. The next four questions are being used to collect basic demographic information of the participants. The next 14 questions are the main survey and consist of **seven questions**. Each question is preceded with a table showing different sources of literature, followed by a short introduction summarised from the tabulated literature. The question are answered by selecting an option from the **seven point Likert likelihood scale for an inner value channelling your (or any designer's) decisions and actions while working in team during design for social innovation projects**. Each question following the likert scale is an optional space which helps to qualify the reason for your selection. The last question is created for you to provide additional comments e.g. any additional references you think the researcher should look at, any other inner values you want the researcher to consider etc.

Informed Consent

Your name or email address will be kept confidential during data analysis and in any publications where this data or its analysis may be used. Personal information may be disclosed to examiners upon request only. By completing this survey you are:

- Confirming that you satisfy the criteria of this research
- Voluntarily agreeing to participate in the survey,

- Understand the information about this survey and the terms of confidentiality explained above,
- Providing your consent to use this data in the doctoral research being carried out by Pratik Vyas (contact number: 07889532880 email: p.vyas@northumbria.ac.uk).

Survey:

Section A: Participant's demographic information

Please Input the Name of Organization(s) You Are Affiliated With:

Please Specify Your Gender: ◉ Male ○ Female ○ Other ○ Prefer not to say

Please Specify Your Experience of Team-based Design for Social Innovation:

○ 0 to 10 years ○ 11 to 20 years ○ 21 to 30 ◉ More than 30 years

Please Specify the Nature of Your Experience:

○ Design Practitioner ○ Design academic ◉ Both ○ other

Section B: Main Survey (Please complete all the questions)

1. Hopefulness for co-operation:

Author	**Context**	**View**
Nowak, 2011	Bio-economics	Symbiotic development
Peterson and Seligman, 2004	Positive psychology	Character Strength for initiating relationship
Luthans et.al., 2001 and Koya, 2014	Leadership	Decision making
Vikari and Tornaghi, 2010	Design for Social Innovation	Inspiring possibility through participation

With regard to Hopefulness, Nowak explains how human society requires hopefulness that the first step of both parties will be towards co-operation. Similarly, Peterson and Seligman from psychology mention that Hopefulness is a virtue, a strength of character, which helps in initiating new relationships. Authors from leadership studies explain how hopeful leaders are able to make holistic decisions because they are inclusive and encouraging in their approach with others. Therefore, Hopefulness as an inner value is considered important for team work during design for social innovation, because it helps to create new relationships that can benefit teams through encouraging participation, inclusive decision making and a positive approach to working together.

In your experience/expert opinion, do designers require the inner value of Hopefulness for co-operation as defined above during team work in design for social innovation?

◉ Always true ○ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

2. Generosity of Spirit

Author	**Context**	**View**
Nowak, 2011	Bio-economics	Sharing benefits and cost of co-operation
Peterson and Seligman, 2004	Positive psychology	Doing more than what is fair
Amabile, Fisher and Pillemer, 2014	Design for Social Innovation	IDEO's Culture of Helping by making collaborative generosity the norm

Generosity of spirit, according to Nowak, is the ability to accept a lower share of benefit or a bigger share of cost arising from co-operation with others. Peterson and Seligman mention Generosity is doing more than what is only fair and co-operating in face of what seems to be a punishment and when kindness cannot be returned. From a Design point of view, generosity is needed for a user-centred approach, participatory approach and co-design approach according to a survey done by IDEO published in Harvard Business Review.

In your experience/expert opinion, do designers require the inner value of Generosity of spirit as defined above during team work in design for social innovation?

◉ Always true ○ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

3. Forgiveness for defection

Author	**Context**	**View**
Nowak, 2011	Bio-economics	Reciprocating defection with co-operation

Peterson and Seligman, 2004	Positive Psychology	Restoration of relationship
Kwon, 2013	Design	Fundamentals of Design for social innovation

The inner value of forgiveness has been extensively studied from various disciplines and different religious studies. Nowak explains forgiveness with the example of a tit for tat strategy where consequences of non-cooperation are too harsh and forgiveness is required to reciprocate non-cooperative action with co-operation, during the next interaction. Peterson and Seligman explain that forgiveness is important for restoration of established relationships. Within design, forgiveness has been considered a fundamental aspect of Design for Social Innovation.

In your experience/expert opinion, do designers require the inner value of Forgiveness as defined above during team work in design for social innovation?

◉ Always true ○ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

4. Patience to let events unfold

Author	**Context**	**View**
Osborn, 2008	Design	Patience towards unacceptable ideas
Nemeth, 2008	Design	Patience towards opposing ideas
Grossman, 2011	Psychology	Not reacting before letting event unfold completely
Hunter and Rigby, 2009	Gandhian Philosophy	Preserving balance in adversity
Swami, 2000	Culture Studies	Not waiting or enduring but actively seeking balance

Many different authors in Design propagate patience. For example, Osborne promotes brainstorming and insists ‘do not interrupt’ which is patience. On the other hand, Nemeth explains discussion and challenging views build knowledge and warns that patience to let

events unfold is required to avoid chaos. It is important to note that patience as an inner value is not passive waiting but an active effort to find balance in the face of adversity.

In your experience /expert opinion, do designers require the inner value of Patience as defined above during team work in design for social innovation?

◉ Always true ○ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

5. Acceptance of situation

Author	**Context**	**View**
Nemeth, 2012	Design	Acceptance of debate and criticism
Osborn, 2008	Design	Acceptance of creative out-of-the-box ideas
Heyes, 1994	Biology	Experiencing event without defence, as they are
Kabat Zinn, 2013	Psychiatry	Facing unexpected events
Peterson and Seligman, 2004	Positive Psychology	Steady thought process irrespective of faced events

With regards to Design, Acceptance of a situation can include accepting other's opinions, as Nemeth explains, or acceptance of other's ideas, as Osborne describes. Acceptance is experiencing an event in a balanced way. This is true for good and bad events. Therefore, Kabat-Zinn explains Acceptance as, 'facing unexpected events' and remaining steady in thoughts and actions.

In your experience /expert opinion, do designers require the inner value of Acceptance as defined above during team work in design for social innovation?

○ Always true ◉ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

6. Being Non-Judgemental

Author	Context	View
Osborn, 2008	Design	'Do not criticize' strategy for creative input
Kabat Zinn, 2013	Psychiatry	Genuine account of reality
Biestek, 1953	Social Work	Avoiding personal bias

In Design, being Non-judgemental is considered important in the work of Osborne, who states, "*Creativity is such a delicate flower that a hint of judgement can hinder it*". A non-judgemental attitude is required to genuinely understand one's own experience along with all associated emotions and feelings. It is an attempt not to let personal bias come in the way of one's own objectivity or another's creativity. However, being non-judgemental should not be equated to not being critical. As Nemeth points out, that while the critical review of ideas is necessary, being judgmental is a final permanent opinion and is based on irrational reasoning, which can hinder discussions. Being non-judgemental means taking decisions based on rational thought or instinct and after considering different avenues.

In your experience /expert opinion, do designers require the inner value of being Non-judgemental as defined above during team work in design for social innovation?

◉ Always true ○ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

7. Keeping Beginner's mind

Author	Context	View
Uzzi, 2007	Creative studies	Correlation between Strength of Relationships and Creativity
Varela, 1993	Enactive cognitive science	Unlearning the fear based synaptic connections

Scharmer, 2010	Leadership theory	Burden of knowledge
Kabat Zinn, 2013	Psychiatry	Experiencing everything as if for the first time
Suzuki, 2000	Japanese wisdom	Letting go preconceptions

Human memory is made of fear based synaptic connections, which are required for survival. However, such old knowledge hinders growth and development through new knowledge. Therefore, Varela talks about Unlearning and mentions keeping a beginner's mind as an important step for improving cognition. It is not an act of forgetting but looking at things from a fresh pair of eyes, as if for the first time. It is the ability to maintain balance between novelty and knowledge in relationships so that creativity can evolve.

In your experience /expert opinion, do designers require the inner value of beginner's mind as defined above during team work in design for social innovation?

◉ Always true ○ Usually true ○ Often True ○ Occasionally true

○ Rarely true ○ Usually not true ○ Almost never true

Reason for your choice:

Additional Comments

Please use the section below for any additional comments you may want to contribute to the researcher. Please also share any other values or terminologies that your experience and expertise recognises as appropriate for team work in a design for social innovation context:

Thank you for completing the survey. If you have any questions, queries or comments or simply want to get in touch, email address of the researcher is p.vyas@northumbria.ac.uk

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